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METROPOLITAN DISTRICT COMMISSION
DIVISION OF WATERSHED MANAGEMENT
QUABBIN SECTION

1998 WATER QUALITY REPORT

Quabbin Reservoir Watershed
Ware River Watershed

Executive Office of Environmental Affairs
Bob Durand, Secretary

Metropolitan District Commission
David B. Balfour, Jr., Commissioner

Division of Watershed Management
Joseph M. McGinn, Esq., Director

Quabbin Section
William E. Pula, P.E., Superintendent

ACKNOWLEDGMENTS

This report was prepared by the Quabbin Environmental Quality Section of the Metropolitan District Commission's Division of Watershed Management. Scott A. Campbell, Environmental Engineer I was the principal author. David Chandler, Environmental Analyst I compiled water quality data tables and assisted with report presentation. The following MDC staff provided comment on this report:

Robert P. Bishop, Environmental Analyst
Peter Deslauriers, Bacteriologist
Matthew Hopkinson, Environmental Engineer
Lisa Gustavsen, Environmental Planner

Philip Lamothe, GIS Specialist provided Geographical Information System data and support.

Sandra St. Pierre provided clerical support.

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ADDITIONAL INFORMATION -
EPA Safe Drinking Water Hotline (800) 426-4791
MDC Home Page: http//www.magnet.state.ma.us/mdc

EXECUTIVE SUMMARY

This report presents the results from the Metropolitan District Commission, Division of Watershed Management's (MDC-DWM) 1998 water quality sampling program conducted on Quabbin Reservoir and its tributaries, including those within the Ware River watershed. Data includes results of physical, biological and chemical analysis of routine sampling at thirty six stations representative of water entering and leaving the Quabbin Reservoir. In 1998, Quabbin laboratory staff collected 1,356 water samples and performed 10,134 water quality analysis on these samples. Because of the magnitude of the data, the figures and tables presented in this report are meant simply to summarize and group the data based on the source supply and its contributing tributaries. For a listing of data compiled for each individual site, the reader should refer to the data tables included in Appendix A.

Throughout 1998, the MDC/DWM continued to supply the Massachusetts Water Resource Authority via the Chicopee Valley Aqueduct (CVA) and Quabbin Aqueduct (Shaft 12) with raw water meeting the stringent source water criteria established for unfiltered systems under the federally mandated Surface Water Treatment Rule (SWTR). To maintain the avoidance of filtration in accordance with the SWTR, the fecal coliform concentration of representative samples of source water prior to disinfection must be equal to or less than 20/100 milliliters (mL) in at least 90% of the samples collected over a six month period. Moreover, turbidity levels must not exceed 1 Nephelometric Turbidity Unit (NTU). On October 30, 1998, fecal coliform levels monitored daily by MDC/DWM staff at the CVA intake (sample site 201) were recorded at their maximum concentration of 6 colonies/100 mL. This fecal coliform spike occurred at a time of year when gulls were actively roosting on the reservoir and harassment measures had not yet commenced. In weekly monitoring conducted from the shoreline nearby the Shaft 12 intake, fecal coliform colonies were recorded at a maximum of 10 per 100 ml on August 10, 1998. Fecal coliform concentrations monitored throughout the year at both reservoir sample stations averaged <1 colony/100 mL. Turbidity levels monitored weekly at the 201 CVA site remained consistent throughout the year, never exceeding 0.3 NTU and averaging slightly below this threshold. Turbidity levels monitored weekly at the Shaft 12 site also averaged slightly below 0.3 NTU. In an isolated event, a maximum level of 0.6 NTU was recorded at Shaft 12 on September 28. Table 1 summarizes water quality conditions entering the two reservoir aqueducts.

The water quality of the Ware River is monitored biweekly from a point downstream of the intake works structure located in Barre, known as Shaft 8. The data showed that water quality improved notably during the allowable diversion period from October 15 through June 15. During this period average fecal coliform and turbidity levels at 9 colonies per 100 mL and 0.82 NTU respectively, were below SWTR threshold levels. Turbidity levels during the allowable diversion period exceeded the 1 NTU standard in five of the 16 samples but average turbidity levels were reduced by 32% from non-diversion period levels. A total of 2,708.9 million gallons of water was diverted from the Ware River to the Quabbin Reservoir during a nine day span in March 1998. Table 2 summarizes Shaft 8 water quality data and compares results during the allowable diversion period to those observed over the entire year.

Infrequently, special water quality studies are collected by DWM staff to help identify sources of pollution, to measure the impacts from construction and other land use alteration activities, and

to better understanding reservoir and stream characteristics that may affect water quality. For instance, in 1998 DWM staff collected 24 samples from the CVA service line for analysis of *Giardia* and *Cryptosporidium (Oo)cysts* and investigated a storm water discharge to the reservoir from a drain pipe located in front of the Administrative Complex. In addition, DWM staff performed follow-up *Bacterial Source Surveys* on the subwatersheds of Atherton Brook, Cadwell Creek, and Rand Brook. Lastly, the DWM embarked on a joint venture with University of Massachusetts at Amherst graduate student, Elisa Garvey to gather extensive water quality data to help characterize cyclic reservoir inputs of nutrients and silica. Analysis of the data being collected monthly from thirteen tributaries and six reservoir stations is planned for a future date in 1999.

Table 1 - Quabbin Reservoir Water Quality Data: Stations 201 & 206

Parameter	Observed Range of Values				Massachusetts Water Quality Standard
	Min.	Max.	Avg.	Median	
Biological					
Total Coliform	0	200	21	5	No Standard
Fecal Coliform	0	10	<1	0	† mean ≤20
Physical and Chemical Characteristics					
Turbidity (NTU)	0.2	3	0.3	0.3	See narrative text.
Color (units)	5	5	5	5	†† 15
Dissolved Oxygen	7.9 mg/L	13.7 mg/L	10.7 mg/L	10.7 mg/L	† min. 6.0 mg/L
Temperature	1°C	25°C	10.9°C	11°C	† max. ≤20°C
PH (units)	6.3	6.7	6.5	6.5	† 6.5-8.3
Alkalinity (mg/L as CaCO3)	3.9	4.4	4.1	4.1	See narrative text.
Hardness (mg/L as CaCO3)	7.3	11.9	10.0	10.4	See narrative text.
Specific Conductance (micromhos per cm)	40	40	40	40	See narrative text.

Notes:

† *MA Inland Class A Water Body Standards* - Minimum criteria required for surface waters to sustain and protect them from the degradation of their designated use(s).

††*MA Secondary Drinking Water Standards* - Used in the absence of available raw water quality standards. These standards and meant only to serve as a guide, the parameters are not known to cause a health risk but may affect the taste, odor and color of water.

1) Coliform concentration reported as number of colonies per 100 mL.
2) PPM - Parts per million, equivalent to one drop in 10 gallons.

Table 2 - Ware River Water Quality Data: Shaft 8						
	Parameter	Observed Range of Values				Massachusetts Water Quality Standard
		Min.	Max.	Avg.	Median	
1998 DATA IN WHOLE	*Biological*					
	Total Coliform	50	1000	205	150	No Standard
	Fecal Coliform	0	210	25	10	† mean ≤20
	Physical Characteristics					
	Turbidity (NTU)	0.4	2.8	1.2	0.9	See narrative text.
	Color (units)	38	110	74.5	75	†† 15
	Dissolved Oxygen	7.4 mg/L	13.7 mg/L	10.6 mg/L	10.6 mg/L	† min. 6.0 mg/L
	Temperature	0°C	23°C	10.7°C	10°C	† max. ≤20°C
	pH (units)	5.8	6.6	6.3	6.4	† 6.5-8.3
	Alkalinity (mg/L as CaCO3)	2.8	8.6	5.3	5.0	See narrative text.
	Specific Conductance (micromhos per cm)	43	80	66.6	70	See narrative text.
DURING ALLOWABLE DIVERSION PERIOD OCT 15 THRU JUN 15	*Biological*					
	Total Coliform	50	700	165	110	No Standard
	Fecal Coliform	0	40	9	6	† mean ≤20
	Physical Characteristics					
	Turbidity (NTU)	0.4	1.5	0.82	0.65	See narrative text.
	Color (units)	38	85	62.7	65	†† 15
	Dissolved Oxygen	9.6 mg/L	13.7 mg/L	11.9 mg/L	12.4 mg/L	† min. 6.0 mg/L
	Temperature	0°C	17°C	6°C	4°C	† max. ≤20°C
	pH (units)	5.8	6.5	6.2	6.3	† 6.5-8.3
	Alkalinity (mg/L as CaCO3)	2.8	6.1	4.6	4.5	See narrative text.
	Specific Conductance (micromhos per cm)	55	73	65.3	67.5	See narrative text.

Notes:

† *MA Inland Class A Water Body Standards* - Minimum criteria established for surface waters to sustain and protect them from the degradation of their designated use(s).

††*MA Secondary Drinking Water Standards* - Used in the absence of available raw water quality standards. These standards are meant to serve as a guide, the parameters are not known to cause a health risk but may affect the taste, odor and color of water.

1) PPM - Parts per million, equivalent to one drop in 10 gallons. 1 PPM = 0.9997 mg/L.

1.0 INTRODUCTION - QUABBIN RESERVOIR AND THE WATERSHED SYSTEM

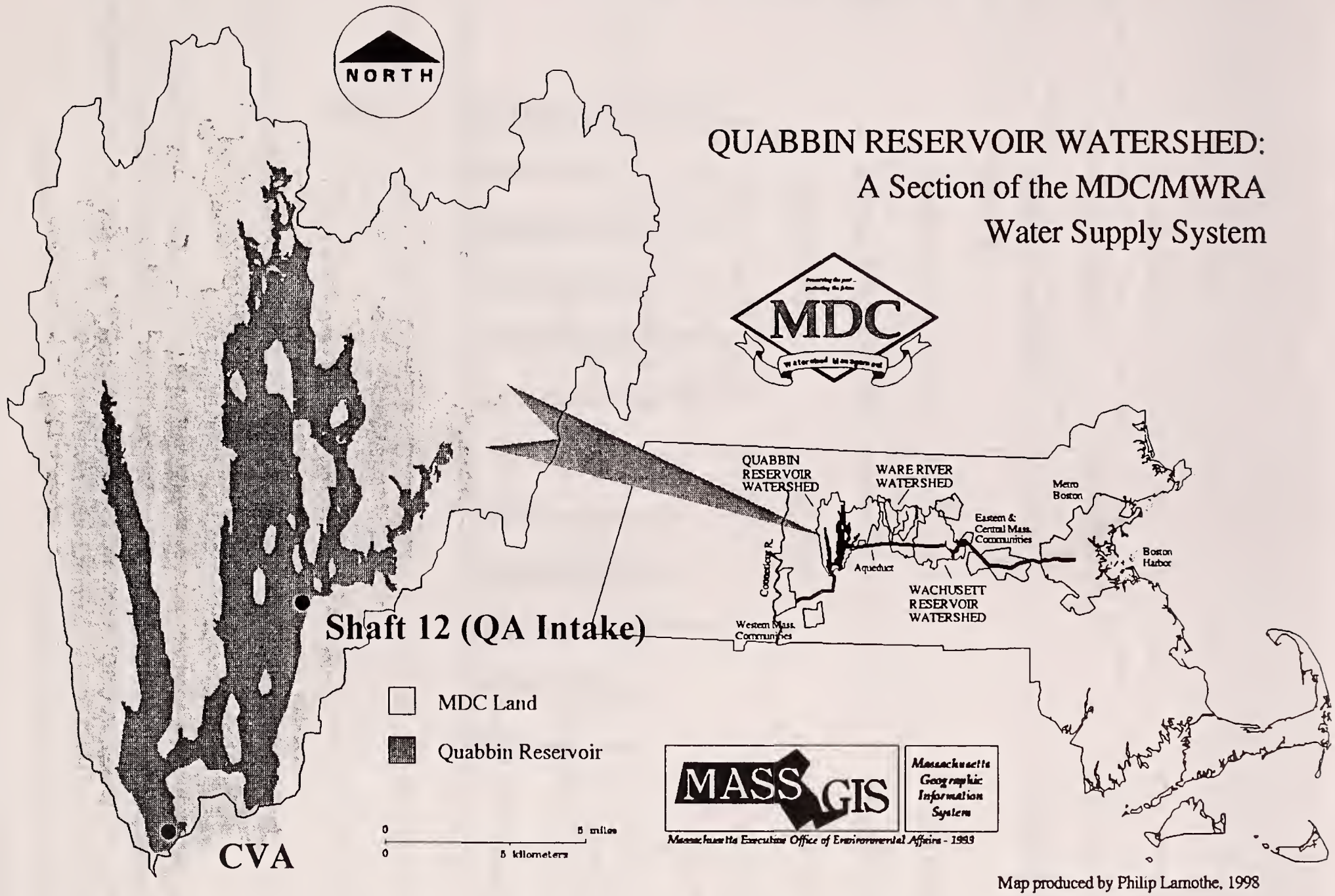
Figure 1 shows the Quabbin Reservoir, Ware River and Wachusett Reservoir watershed system that supplies drinking water to Boston and 46 other member communities that make up the Massachusetts Water Resources Authorities service territory. The largest of the three interconnected sources is Quabbin Reservoir, a 412 billion gallon impoundment of the Swift River located in Central Massachusetts. Quabbin Reservoir transfers to Wachusett Reservoir via the Quabbin Aqueduct Intake at Shaft 12 typically account for more than half of MWRA's system supply. Quabbin Reservoir also supplies a much smaller amount of water directly to three western Massachusetts communities via the Chicopee Valley Aqueduct (CVA). Water is delivered via two gravity fed aqueduct systems whose intake structures are labeled in Figure 1. The Quabbin Aqueduct intake at Shaft 12 is located along the Quabbin Reservoir's eastern shoreline in Hardwick, MA. The CVA intake lies at the base of Winsor Dam in Belchertown, MA. MDC has maintained a SWTR "filtration waiver" status for its CVA supply since 1992. A filtration waiver for Wachusett Reservoir is pending further review by the State Department of Environmental Protection and Federal Environmental Protection Agency. The Ware River watershed serves as a supplemental supply to the Quabbin Reservoir. Waters from Ware River are diverted into the Quabbin Aqueduct at Shaft 8 in Barre, MA and directed west towards Quabbin via gravity flow. Diversions are limited to periods when Ware River flows exceed 85 MGD and require DEP approval unless conducted during the allowable diversion period from October 15 to June 15. The focus of this report is the Quabbin watershed and supplemental supplies from Ware River diversions.

Quabbin Reservoir watershed is about 19 miles long, 13 miles wide, and contains roughly 120,000 acres. More than 90% of watershed lands are forested and the Metropolitan District Commission owns and controls 53,000 acres (55%) for water supply protection. The majority of non-MDC owned land is maintained as private forest. Developed lands can be characterized by low density residential and limited agricultural sites.

The Ware River watershed is about 11 miles long, 7 miles wide, and contains roughly 62,000 acres. Nearly 75% of the watershed is forested and the Metropolitan District Commission owns and controls 22,000 acres (35%) for water supply protection. The vast majority of private lands are maintained as forests and developed lands consist primarily of low density residential and agricultural sites.

No wastewater treatment plant discharges are currently permitted in tributaries to either of the three water supplies. Industrial and commercial sites throughout the three watersheds are limited.

Figure 1 - MDC Watershed System Map



Map produced by Philip Lamothe, 1998

TABLE 3
QUABBIN RESERVOIR FACTS AND FIGURES - 1998

FACTS ABOUT THE RESERVOIR		FACTS ABOUT THE WATERSHED	
Capacity	412 Billion Gals	**Watershed Area**	120,000 acres
Surface Area	24,000 acres	**Land Area**	96,000 acres
Length of Shore	118 miles	**MDC Owned Land**	53,000 acres
Maximum Depth	150 feet	**% MDC Owned**	55%
Mean Depth	45 feet	**Forested Lands**	83,235 acres
Surface Elevation	530 feet	**Wetlands**	5,289 acres
Year Construction Completed	1939	**Avg. Reservoir Gain From 1" of Precipitation**	1.6 Billion Gallons

Maximum Reservoir Elevation: 530.30 ft - July 2, 1998
Minimum Reservoir Elevation: 523.03 ft - January 2-4, 1998

Flow Discharged from Reservoir Spillway: 3928.7 MG
Number of Days Flows Discharged Over the Spillway: 86 days -> 4/11/98-6/2/98 & 6/20/98-7/22/98

Ware River Diversions to Quabbin: 2708.9 MG – 9 days -> 3/11/98-3/16/98 & 3/18/98-3/20/98

Average Daily Flow Entering CVA: 8.98 MGD

Average Daily Flow Entering Shaft 12: 235.24 MGD (152 days in which water was released to Wachusett Reservoir)

Annual Snowfall on Quabbin Reservoir Watershed (Admin. Bldg. Sampler): 18.0 inches
Average Seasonal Snowfall (Admin. Bldg. Sampler November-April): 48.21 inches
Annual Precipitation on Quabbin Reservoir Watershed (Admin. Bldg. Sampler): 43.38 inches
Mean Rainfall Event (1990-95 Admin Bldg. records): 0.40 inches
Mean Annual Precipitation Enfield/Admin. Bldg. records 1929-97: 46.27 inches

Reservoir Ice Cover:
February 17 - February 19, first significant ice cover reported, thin and patchy.

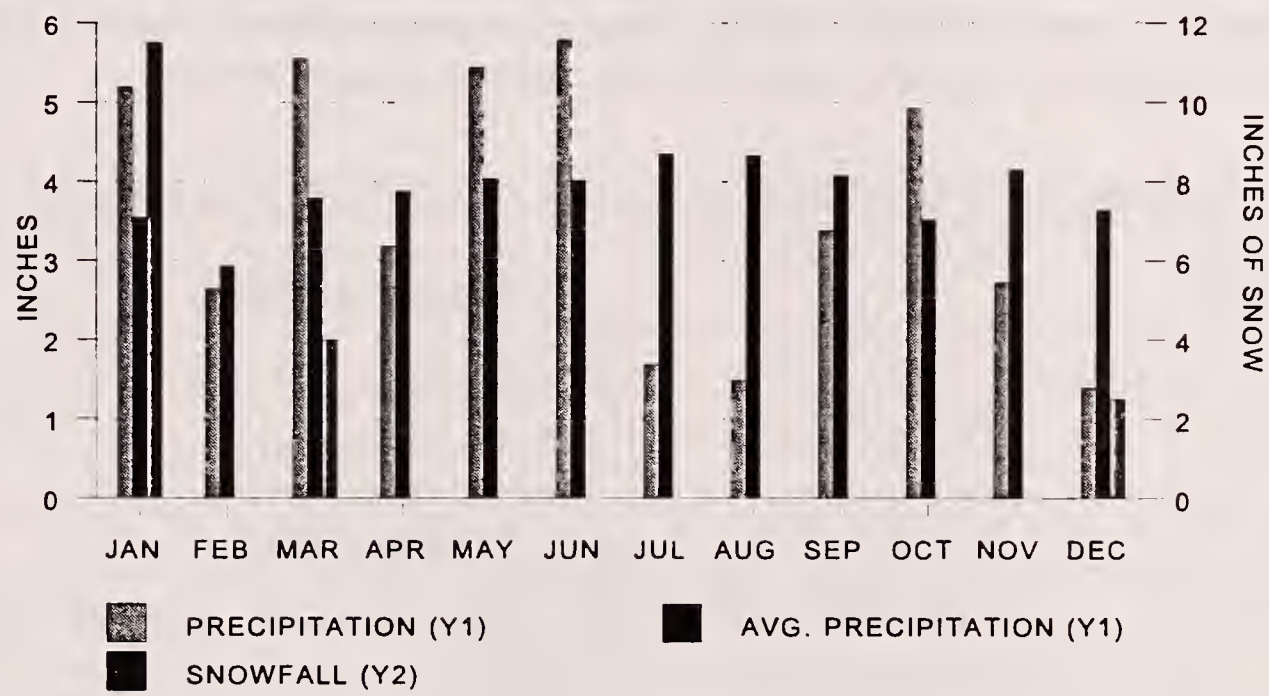
MG - Million Gallons ***MGD - Million Gallons Per Day***

PRECIPITATION

The Quabbin Civil Engineering Section compiles precipitation data from six weather stations located throughout the two watersheds. A general summary of 1998 precipitation totals is presented below. Precipitation events have been displayed graphically in Appendix B of this report.

Annual precipitation totals, recorded at the Administration Building sample station in Belchertown, MA since 1930, average 46.27 inches. Precipitation is typically distributed equally throughout the year. In 1998, the precipitation total of 43.38 inches fell slightly below the 68 year average. Despite monthly precipitation totals that were above average in five of the months, especially dry periods in July, August, November and December could be attributed to the below average annual rainfall. Water that discharged over the reservoir spillway totaled 3928.7 million gallons and occurred over a period of 86 days. The spillway began discharging on April 11 and ended June 2, then started again on June 20 before ending on July 22.

Figure 2 - MONTHLY PRECIPITATION VS. AVERAGE
BELCHERTOWN, MA - ADMIN. BLDG.



SNOWFALL

The 1998 snowfall total of 18.0 inches was well below the seasonal average of 48.21 inches. Mild winter temperatures and the lingering effects of El Nino are possible explanations for the unusually low snowfall total.

2.0 WATER QUALITY SAMPLING PROGRAM

To characterize the quality of water entering and leaving the reservoir water samples were routinely collected from twenty streams and seven ponds located throughout the two watersheds. The MDC also routinely monitored water quality at five sites located on or representing water withdrawn from the reservoir. MDC staff collect grab samples at the start of each week. Sample collection is performed year round and regardless of weather conditions, thereby providing a good representation of various flow conditions and pollutant loadings. All sample site locations, sampling frequencies, and methodologies were the same as those used the previous year. Table 4 contains a listing of reservoir sampling stations with site characteristics. Tables 5a and 5b list tributary sampling sites with drainage area attributes for each watershed.

For most parameters, analysis is performed in-house by Quabbin Laboratory staff. Laboratory analysis on each tributary sample site includes a bi-weekly test for total and fecal coliform, alkalinity, pH, specific conductance and turbidity. Analysis is also performed quarterly for color, chloride, hardness, total and fixed solids, and iron. MDC staff determine temperature and dissolved oxygen levels in the field during grab sampling, using a YSI Model 57 dissolved oxygen meter. During the months of April through November, laboratory staff utilized a hydrolab surveyor II field instrument to determine monthly reservoir depth profiles for temperature, pH, dissolved oxygen, and specific conductance. Revet Laboratory in Framingham, MA provided contract laboratory services to perform nutrient, metal and volatile organic compound analysis of special sampling. Listed below are standard methods employed for analysis and sample collection.

QUABBIN LABORATORY METHODS USED FOR FIELD AND LABORATORY ANALYSIS

PARAMETER	STANDARD METHOD
Turbidity	SM 2130 B
pH	SM 4500-H+B Hydrolab Surveyor II Orion 811 meter
Alkalinity	SM 2320 B (low level)
Chloride	SM 4500-Cl C
Hardness	SM 2340 C
Color	SM 2120 B
Conductivity	HACH DREL/5 meter Hydolab Surveyor II
Temperature	YSI Model 57 DO meter Hydrolab Surveyor II
Dissolved Oxygen	YSI Model 57 DO meter Hydrolab Surveyor II
Iron	HACH DR/3 Spectrophotometer
Total Solids	SM 2540 B
Fixed Solids	SM 2540 E
Total Coliform	SM 9222 B
Fecal Coliform	SM 9222 D

Table 4 - 1998 Quabbin Reservoir Sample Stations			
Station	Location	Universal Transverse Mercator (UTM) Coordinates*	Frequency
(201) CVA Outlet	Winsor Power Station, bldg. tap	130448.40, 892497.60	Daily - Constitutes AM collection Monday thru Thursday. Sampling is increased with an additional PM sample collected seven days a week during phases of the *Gull Control Program.*
(206) Shaft 12 shoreline	Shoreline beside Shaft 12 intake building	135866.90, 902601.20	Weekly
Shaft 11A	Quabbin Aqueduct outlet on Quabbin shoreline, east of baffle dams.	139244.40, 902997.10	Weekly during Ware River diversions.
QR01/202 CVA Intake	Quabbin west arm off of Winsor Dam	129908.40, 893432.60	Monthly**
QR06/206	At site of old Quabbin Lake, off shore of Shaft 12	135308.80, 902472.80	Monthly**
QR10/Den Hill	North of Den Hill	136910.90, 904555.50	Monthly**

*** UTM coordinates referenced using NAD 27.**

**** In 1998, depth and temperature profiles were determined at these sites during the months of April through October.**

QUABBIN RESERVOIR WATERSHED:
1998 Water Quality Sample Sites

Metropolitan District Commission - Division of Watershed Management

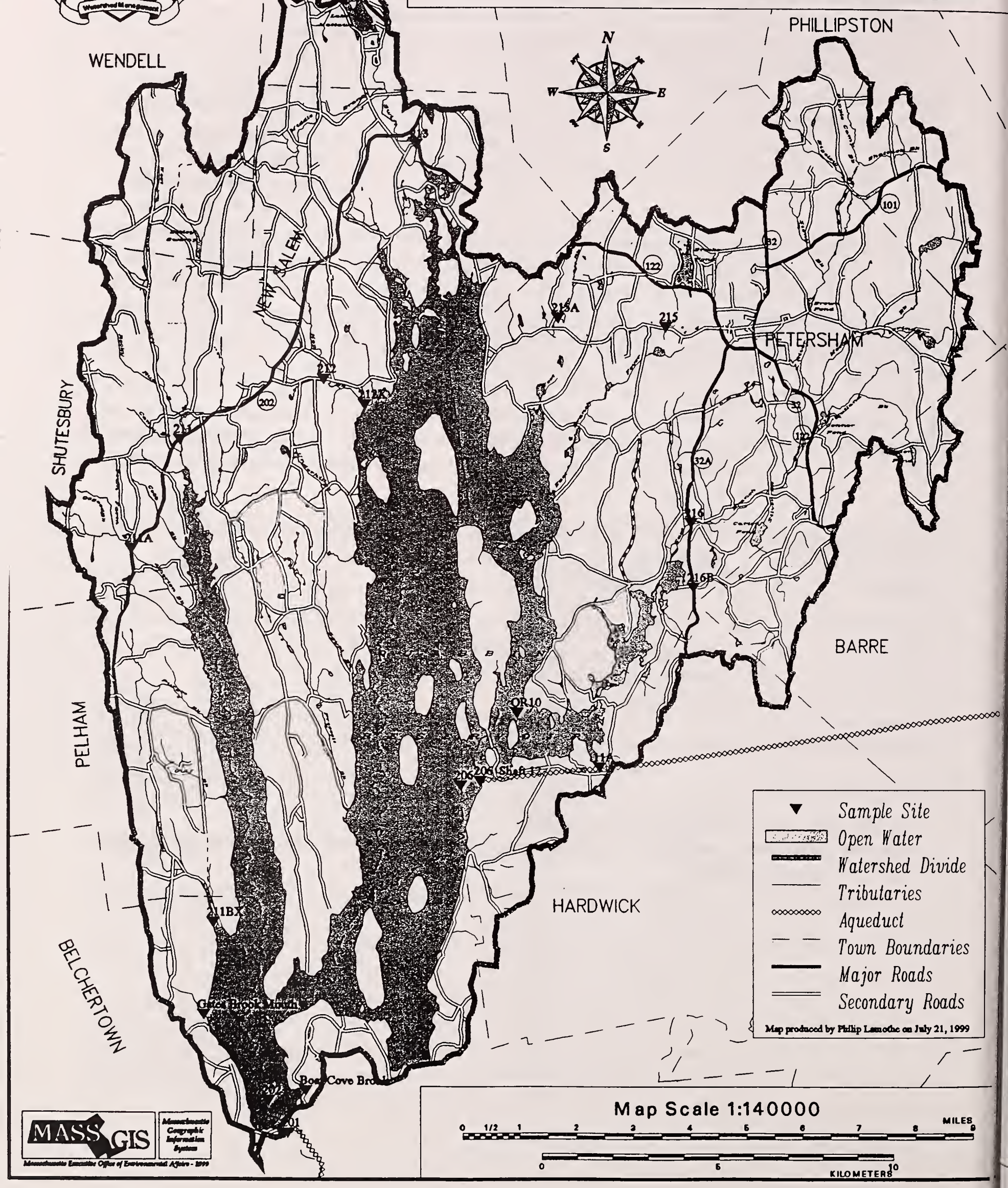


Table 5a - 1998 Quabbin Reservoir Tributary Sampling Stations

Station	Location	Universal Transverse Mercator (UTM) Coordinates*	Frequency	Drainage Area (sq. mi.)	MDC Owned Land (%)	Basin Impervious Cover (%)**	Wetland Composition
(216) East Branch Swift River	Rt. 32A, 3.7 mi. upstream mouth	141825.60, 909967.70	BW	30.3	1.67	3.5	10.4
(211) West Branch Swift River	Rt. 202, 1.6 mi. upstream mouth	127414.20, 912291.60	BW	12.4	33	3.4	3.43
(213) Middle Branch Swift River	Gate 30, 1.6 mi. upstream mouth	134058.40, 920708.30	BW	9.14	22.7	4.4	8.14
(212X) Hop Brook	At mouth.	132643.10, 913297.80	BW	5.43	44.8	4.2	2.7
(212) Hop Brook	Gate 22, 0.9 mi. upstream mouth.	131492.30, 914020.10	BW	4.52	32	--	--
(215) East Branch Fever Brook	West St., 4.2 mi. upstream mouth	141102.90, 915522.60	BW	4.15	12.3	3.7	11.45
(215A) West Branch Fever Brook	Womens Fed. 1.7 mi. upstream mouth	138056.80, 915770.90	BW	2.69	18.4	--	8.9
(211BX) Cadwell Creek	At mouth	128356.80, 898548.60	BW	2.59	98	3.5	3.27
(216B) Rand Brook	Rt. 32A, 0.3 mi. upstream mouth	141890.90, 908130.80	BW	2.42	22.7	--	--
(211A) Atherton Brook	Rt. 202, 1.4 mi. upstream mouth	126053.10, 909179.40	BW	1.83	36	--	3.24
Gates Brook	Gate 5 at mouth	128076.40, 895894.60	BW	0.93	100	3.2	2.96
Boat Cove Tributary	At mouth	130959.40, 893716.20	BW	0.15	100	--	<<1

Frequency: BW = biweekly *UTM coordinates referenced using North American Datum (NAD) 27. **See Section 4.0 for discussion of methodology used.

WARE RIVER WATERSHED:

1998 Water Quality Sample Sites

Metropolitan District Commission - Division of Watershed Management

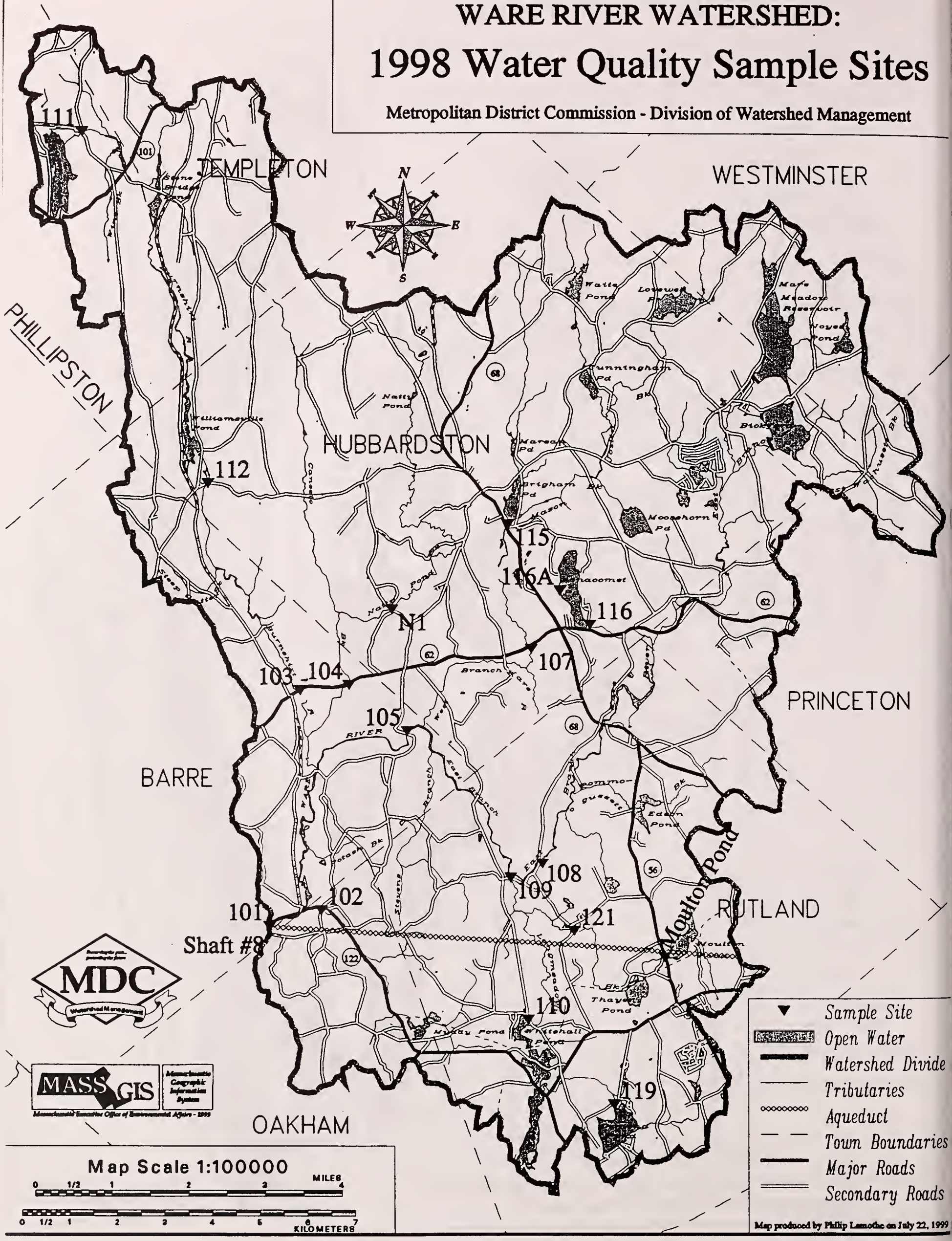


Table 5b - 1998 Ware River Tributary Sampling Stations

Station	Location	Universal Transverse Mercator (UTM) Coordinates*	Frequency	Drainage Area (sq. mi.)	MDC Owned Land (%)	Basin Impervious Cover (%)***	Wetland Composition (%)
(111) Queen Lake	Road culvert	737314.72, 4713853.18	BW	0.71	0	4.4	36.8
(112) Burnshirt River	Williamsville	740302.75, 4706499.91	BW	11.38	2.5	4.0	14.5
Natty Pond Brook	Hale Road	744271.18, 4703993.42	BW	5.49	33.2	5.6	14.0
(104) Canesto & Natty Brooks	Rt. 62	743438.48, 4702349.34	BW	12.71	28.0	4.8	8.7
(103) Burnshirt River**	Rt. 62	742417.41, 4702189.75	BW	18.44	23.5	3.7	11.7
Ware River	Shaft 8	741974.88, 4697138.30	BW	96.5	37.1	4.2	13.2
(102) Parker Brook	Near mouth	743037.94, 4697525.99	BW	4.90	82.7	3.4	9.6
(110) Long & Whitehall Pond	Outlet	747478.62, 4695359.05	BW	5.39	37.7	4.9	17.8
(107) West Branch Ware River**	Rt. 62	747232.57, 4703274.853	BW	16.63	44.9	--	15.1
(116) Asnacomet Pond	Outlet	747782.81, 4704541.58	BW	0.84	20.9	4.6	29.8
(105) Ware River	Barre falls	744691.70, 4701416.45	BW	55.1	34.5	4.4	15.6
(108) East Branch Ware River	New Boston	747583.35, 4698773.88	BW	22.04	12.3	4.9	16.5
(109) Longmeadow Brook**	Near mouth	746985.70, 4698388.56	BW	12.24	47.8	--	---
(121) Mill Brook	Charnock Hill Rd	748372.91, 4697303.13	BW	3.48	13.1	5.3	15.5
(115) Brigham Pond	Outlet	746627.62, 4705896.43	BW	11.37	37.4	4.2	15.4
Moulton Pond	Outlet	750306.07, 4696825.89	BW	1.71	2.0	5.8	16.4
(119) Demon Pond	Outlet	749364.30, 4693609.89	BW	2.25	14.2	5.1	18.2

Notes: 1) BW - Biweekly 2) *North American Datum (NAD) 27. 3) **Area represents totals of basin in which sample site lies.***See Section 4.0 for methodology.

3.0 WATER QUALITY DATA

Water quality data for individual sample stations can be found in Appendix A of this report. Tables 6a and 6b list for each watershed, the parameters monitored with ranges of minimum, maximum, average, and median concentrations. Provided below is a brief discussion on each parameter routinely monitored in watershed streams. Information in this section was referenced from the Massachusetts Surface Water Quality Standards, Principles of Water Quality (1984) and USEPA's 1986 Quality Criteria for Water.

Biological

Coliform Bacteria

Total and fecal coliform bacteria are used as possible indicators of fecal matter contamination because they are normal inhabitants of the intestinal tract of man and other animals. Levels can vary greatly depending upon pollutant inputs, stream temperatures, precipitation inputs and stream flows. Geldreich and Kenner (1969) reported bacterial densities (# fecal colonies per gram of feces shed) for cows and humans to be in the range of 230,000 to 13,000,000 respectively. The Massachusetts Class A, inland water standard for fecal coliform is an arithmetic mean of ≤20/100mL, and, no more than 10% of representative samples shall exceed 100/100mL.

Physical and Chemical Characteristics

Impervious Cover

The impervious cover of the contributing land area was estimated for selected sample sites. Schueler et al. have used the degree of impervious cover to model impacts to receiving streams. A value of 10% is regarded as a threshold to denote the transition from a sensitive to impacted stream. Impervious cover >25% has been classified as a non-supporting stream. Percent impervious cover estimated for Quabbin Reservoir and Ware River subwatersheds ranged from a low of 3.2% for the Gates Brook basin, to a high of 5.8% for Moulton Pond. Mean values for drainage basins within the Quabbin Reservoir and Ware River watersheds were 3.7% and 4.6% respectively. Impervious cover was estimated using land use classification data and the direct measurement of roadways. Land use data was obtained from the MDC/MWRA Landuse Program, which interpreted Spring 1992-93 aerial photography. Standardized values of imperviousness, reported by Kluitenberg, 1994, were used for estimating purposes.

Turbidity

Turbidity is the relative measure of the amount of light refracting and absorbing particles suspended in the water column. Turbidity is used as an indicator of water aesthetics and as a relative measure of the water's productivity. Excessive turbidity can interfere with treatment efficiency and may be harmful to aquatic species. The drinking water standard is 5 NTU for source water and 1 NTU for finished water.

Color

Color is caused by particulate matter such as decaying organics and certain inorganic materials. Color is an important characteristic because it is an indication of humic content and , therefore, of dissolved organics. Organic compounds are a concern because there is the potential of forming carcinogenic compounds when reacted with chlorine disinfectant.

Table 6a - Tributary Water Quality Data: Quabbin Reservoir Watershed					
Parameter	**Observed Range of Values**				**Massachusetts Water Quality Standard**
	Min.	Max.	Avg.	Median	
Biological					
Total Coliform	19	2000	199	110	No Standard
Fecal Coliform	0	2000	58	6	† mean ≤20
Physical and Chemical Characteristics					
Turbidity (NTU)	0.2	10	0.79	0.5	See narrative text.
Color (units)	7	95	32	28	†† 15
Dissolved Oxygen	2.9 mg/L	14.2 mg/L	10.2 mg/L	10.4 mg/L	† min. 6.0 mg/L
Temperature	0°C	22°C	9°C	7°C	† max. ≤20°C
pH (units)	5.1	7.4	6.3	6.3	† 6.5-8.3
Alkalinity (mg/L as CaCO3)	1.5	39.3	6.5	5.3	See narrative text.
Hardness (mg/L as CaCO3)	5.3	23.8	12.7	12.3	See narrative text.
Specific Conductance (micromhos per cm)	23	130	63.1	62	See narrative text.
Total Solids	25 PPM	88 PPM	53.3 PPM	55 PPM	See narrative text.
Fixed Solids	20 PPM	63 PPM	37.1 PPM	35.5 PPM	See narrative text.
Inorganic Compounds					
Iron	0.03 PPM	1.22 PPM	0.27 PPM	0.19 PPM	†† 0.3 PPM
Chlorides	2.6 PPM	145 PPM	15.7 PPM	12.1 PPM	†† 250 PPM

Notes:

† *MA Inland Class A Water Body Standards* - Minimum criteria required for surface waters to sustain and protect them from the degradation of their designated use(s).

†† *MA Secondary Drinking Water Standards* - Used in the absence of available raw water quality standards. These standards and meant only to serve as a guide, the parameters are not known to cause a health risk but may affect the taste, odor and color of water.

1) Coliform concentration reported as number of colonies per 100 mL.

2) PPM - Parts per million, equivalent to one drop in 10 gallons. 1 PPM = 0.9997 mg/L.

Table 6b - Tributary Water Quality Data: Ware River Watershed					
Parameter	**Observed Range of Values**				**Massachusetts Water Quality Standard**
	Min.	Max.	Avg.	Median	
Biological					
Total Coliform	2	1500	152	100	No Standard
Fecal Coliform	0	2000	23	3	† mean ≤20
Physical and Chemical Characteristics					
Turbidity (NTU)	0.3	5	0.9	0.7	See narrative text.
Color (units)	7	150	55.8	47	†† 15
Dissolved Oxygen	0.4 mg/L	15 mg/L	9.1 mg/L	9.1 mg/L	† min. 6.0 mg/L
Temperature	0°C	26°C	10.9°C	10°C	† max. ≤20°C
pH (units)	5.6	7.1	6.3	6.3	† 6.5-8.3
Alkalinity (mg/L as CaCO3)	2.1	45.4	6.7	5.7	See narrative text.
Hardness (mg/L as CaCO3)	7.6	32.2	13.8	12.4	See narrative text.
Specific Conductance (micromhos per cm)	32	220	79.4	60	See narrative text.
Total Solids	22 PPM	139 PPM	63 PPM	55 PPM	See narrative text.
Fixed Solids	10 PPM	109 PPM	40.9 PPM	32.5 PPM	See narrative text.
Inorganic Compounds					
Iron	0.05 PPM	3.4 PPM	0.55 PPM	0.32 PPM	†† 0.3 PPM
Chlorides	4 PPM	52.9 PPM	17.4 PPM	13.5 PPM	†† 250 PPM

Notes:

† *MA Inland Class A Water Body Standards* - Minimum criteria required for surface waters to sustain and protect them from the degradation of their designated use(s).

†† *MA Secondary Drinking Water Standards* - Used in the absence of available raw water quality standards. These standards are meant only to serve as a guide, the parameters are not known to cause a health risk but may affect the taste, odor and color of water.

1) Coliform concentration reported as number of colonies per 100 mL.

2) PPM - Parts per million, equivalent to one drop in 10 gallons. 1 PPM = 0.9997 mg/L.

Dissolved Oxygen

Aquatic life depends on oxygen dissolved in water for its survival. Oxygen levels are depleted through the oxygen requirements of aquatic life, the decomposition of organic matter and the introduction of foreign oxygen-demanding substances. Stream flow, turbulence and physical characteristics of the stream principally drive reaeration. The Massachusetts Class A, inland water standard is a minimum of 6.0 mg/L for cold water fisheries.

Temperature

In 1997, stream temperatures ranged from 0 to 25 degrees Celsius among Quabbin and Ware River tributaries. The Massachusetts Class A, inland water standard is a maximum of 20°C for cold water fisheries.

pH

The pH is the measure of the water's reactive characteristics. A drop in pH by one unit represents a ten-fold increase in acidity. The lower the pH the more likely the water will dissolve metals and other substances. A value of 7 indicates neutral water. pH is also an important factor in the solubility of persistent heavy metals such as mercury. At pH levels below 6, soluble methyl mercury remains incorporated in the water system and can be more readily accumulated in the tissue of living organisms. The standard specified for Massachusetts Class A, inland waters ranges from 6.5 to 8.3.

Alkalinity

Alkalinity is a relative measure of the water's ability to neutralize acidic inputs, and thus is a measure of a waterbodies defense against acidification. It is also commonly used as a tool for measuring the total inorganic carbon of a system. The Massachusetts Acid Rain Monitoring project utilizes alkalinity to categorize and rank sensitivity of waters to impacts from acid rain. Sensitivity criteria ranges from 0 to 20 mg/L of alkalinity with zero categorized as acidified and 10-20 as sensitive.

Hardness

Hardness is principally an indirect measure of the calcium and magnesium ions present in water. In general, water containing less than 50 mg/L as $CaCO3$ is considered "soft" and corrosive. In conventional water treatment, "hard" water has been shown to play a significant role in preventing the leaching of potentially toxic metal ions such as lead, cadmium and zinc from bounded, insoluble complexes.

Specific Conductance

Conductance is principally used as an indicator of the amount of dissolved minerals within the water. Specific electrical conductance is the measure of the ability of water to conduct an electrical current.

Total and Fixed Solids

Total solids is a measure of the amount of total dissolved and suspended matter. Total fixed solids is a measure of inorganic grit and dissolved inorganic matter, plus ash of organic matter. A concentration of 80 mg/L of fixed solids (200 mg/L total) is representative of a weak domestic sewage (Clark et al, 1977).

Inorganic Compounds

Iron (Fe)
Iron is a natural element found in rocks, soil and used widely in steel products and in water supply piping. Iron is generally found in natural water bodies at concentrations below 0.5 mg/L. Concentrations greater than 0.1 mg/L can precipitate after exposure to the air, causing staining and objectionable tastes.

Chlorides
The secondary drinking water standard for chloride is 250 mg/L to avoid brackish tastes. Salt used for highway de-icing is typically the principal source of surface and groundwater contamination. Other sources include sedimentary rocks and waste discharges from hard water softener units.

4.0 SPECIAL INVESTIGATIONS

Provided below is a brief overview DWM investigations and responses to site-specific sources of pollution. Sampling results from field investigations are included in Section 6.4, Special Investigations.

Giardia and Cryptosporidium

The MDC-DWM monitored for the presence of *Giardia spp.* cysts and *Cryptosporidium spp.* oocyst at the point of entry to the Chicopee Valley Aqueduct by collecting water samples on a bi-weekly basis throughout the year. Sample collection and analysis follows protocols established by Standard Methods, 19th Edition, 1995 and from the Draft Analytical Guidance Manual for the ICR, US EPA, 1995. The Erie County Water Authority of New York analyzed samples. MDC staff performs the necessary filtering process required during collection and ships the ice-preserved samples to the NY laboratory within 48 hours of collection. Equipment utilized for sample collection includes a portable water filtering unit equipped with a flowmeter, battery powered pump, polypropylene-wound cartridge filter (1 um), and clear laboratory tubing. The volume of water filtered is typically 100 gallons.

Stream Surveys

In response to elevated fecal coliform levels or suspected pollution threats, follow-up stream surveys and/or sampling was performed on the following streams:

Rand Brook - May 1998 Cadwell Creek - August 1998 Atherton Brook - August 1998

Summarized accounts of field surveys have been included in the appendix of this report.

Characterization of Reservoir and Subwatershed Natural Organic Matter Inputs and Dynamics

In October DWM staff embarked on a joint venture with the University of Massachusetts, Department of Civil and Environmental Engineering to gather extensive water quality data to characterize inputs, outflows and transformations of natural organic matter within the reservoir. In 1999, MDC will continue the monthly sampling of thirteen tributaries and six reservoir stations to quantify measure

seasonal inputs. Parameters being monitored include temperature, alkalinity, dissolved oxygen, pH, specific conductance, total phosphorous, total kjeldahl nitrogen, nitrate, ammonia, silica, total organic carbon, dissolved organic carbon, ultraviolet light absorbance, THM FP (formation potential), chlorophyll and molecular weight distribution. Analysis of results is planned for sometime in 1999.

APPENDIX A

WATER QUALITY DATA TABLES

Quabbin Reservoir Tributaries

(206) Quabbin Reservoir at Shaft #12 ..... A - 1
(201) Quabbin Reservoir at Outlet Building ..... A - 2
(211) West Branch of Swift River at Rt. 202 ..... A - 9
(213) Middle Branch of Swift River at Gate #30 ..... A - 10
(216) East Branch of Swift River at Rt. 32A ..... A - 11
Boat Cove Brook Near Mouth ..... A - 12
Gates Brook at Mouth ..... A - 13
(211B-X) Cadwell Brook at Mouth ..... A - 14
(211A) Atherton Brook at Rt. 202 ..... A - 15
(212) Hop Brook at Gate #22 ..... A - 16
(212-X) Hop Brook at Mouth ..... A - 17
(215A) West Branch of Fever Brook – Women's Fed. ..... A - 18
(215) East Branch of Fever Brook on West Road ..... A - 19
(216B) Rand Brook at Rt. 32A ..... A - 20

Ware River Tributaries

Ware River at Shaft #11A ..... A - 21
Ware River at Shaft #8 ..... A - 21
(111) Queen Lake at Road Culvert ..... A - 22
(112) Burnshirt River at Williamsville Road ..... A - 23
(103) Burnshirt River at Rt. 62 ..... A - 24
(115) Brigham Pond at Outlet ..... A - 25
(116) Asnacomet Pond at Outlet ..... A - 26
(116A) Asnacomet Pond at Beach ..... A - 26
(107) West Branch of Ware River at Rt. 62 ..... A - 27
(108) East Branch of Ware River at New Boston ..... A - 28
(105) Ware River at Barre Falls ..... A - 29
(104) Canesto and Natty Brooks at Junction at Rt. 62 ..... A - 30
(109) Longmeadow Brook at Mouth ..... A - 31
(121) Mill Brook at Charnock Hill Road ..... A - 32
Moulton Road Below Dam ..... A - 33
(110) Long and Whitehall Ponds at Outlet ..... A - 34
(119) Demon Pond at Outlet ..... A - 35
(102) Parker Brook Near Mouth ..... A - 36
(N1) Natty Pond Brook at Hale Road ..... A - 37

Other – MDC Drinking Water

Fire Hydrant ..... A - 38
Administration Building Water Tank ..... A - 38
Hanger Bath Tap ..... A - 38
Visitor Center Fountain ..... A - 38
Main Office Fountain ..... A - 38
Blacksmith Shop Fountain ..... A - 39
Ranger Station Tap ..... A - 39
Quabbin Forestry Building ..... A - 39

Other – MDC Drinking Water (con't.)

Cemetery Tap ..... A - 40
New Salem Forestry Tap ..... A - 40
Ware River Office Tap ..... A - 40

Special Investigations

Miscellaneous Field Studies ..... A - 41

Quabbin Reservoir Stations

(202) Winsor Dam ..... A - 43
(206) Shaft #12 ..... A - 47
Den Hill ..... A - 50

QUABBIN LABORATORY RECORDS 1998
(06) QUABBIN RESERVOIR @ SHAFT #12

ATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
1/05	0.3				6.5	4.1	2.4	11.7	87	3				40	7	0
1/12	0.3				6.6	4.3	2.5	12.1	85	1				40	5	0
1/20	0.3				6.5	4.1	2.3	12.4	90	2				40	2	0
1/26	0.3				6.6	4.4	2.6	12.7	89	1				40	0	0
2/02	0.3				6.5	4.2	2.3	12.6	89	1				40	2	0
2/09	0.3	5	5.6	11.9	6.5	4.4	2.8	12.6	89	1	22	18	0.03	40	1	0
2/17	0.3				6.5	4.4	2.8	13.0	91	1				40	0	0
2/23	0.3				6.5	4.4	2.9	12.8	93	2				40	0	0
3/02	0.3				6.5	4.2	2.8	13.0	94	2				40	3	0
3/09	0.4				6.5	4.2	2.7	12.6	94	3				40	7	0
3/16	0.4				6.6	4.1	2.5	13.0	94	2				40	2	0
3/23	0.3				6.6	4.4	2.6	12.4	90	2				40	5	0
3/30	0.3				6.6	4.1	2.3	12.7	97	4				40	2	0
4/06	0.3				6.5	4.2	2.2	12.7	99	5				40	1	0
4/13	0.3				6.5	4.3	2.8	12.6	98	5				40	1	0
4/21	0.3				6.5	4.0	2.3	11.8	104	10				40	1	0
4/27	0.3				6.6	4.3	2.8	12.0	99	7				40	8	0
5/04	0.3				6.6	4.1	2.5	11.4	103	11				40	100	0
5/11	0.3				6.6	4.3	2.8	11.2	97	9				40	25	0
5/18	0.3	5	6.0	10.9	6.7	4.1	2.4	10.2	100	15	28	19	0.03	40	1	0
5/26	0.2				6.6	4.0	2.3	9.8	97	15				40	50	0
6/01	0.3				6.6	4.2	2.5	9.3	96	17				40	0	0
6/08	0.3				6.6	4.2	2.6	9.4	95	16				40	10	0
6/15	0.2				6.6	4.0	2.5	9.2	102	21				40	3	0
6/22	0.2				6.5	4.2	2.7	8.7	98	22				40	28	0
6/29	0.2				6.6	4.3	2.7	8.6	97	22				40	24	1
7/06	0.2				6.6	4.1	2.5	8.6	95	21				40	3	0
7/13	0.2				6.6	4.1	2.4	8.3	94	22				40	24	2
7/20	0.2				6.6	4.3	2.7	8.3	99	25				40	50	3
7/27	0.2				6.7	4.2	2.7	8.1	96	25				40	20	5
8/03	0.2				6.6	4.2	2.8	8.0	94	24				40	4	0
8/10	0.2	5	6.5	10.3	6.7	4.0	2.3	8.0	95	25	30	21	0.05	40	4	2
8/17	0.2				6.6	4.0	2.5	8.0	95	25				40	8	2
8/24	0.2				6.6	4.0	2.6	8.0	92	23				40	48	1
8/31	0.2				6.5	4.0	2.5	7.9	92	24				40	100	10
9/08	0.2				6.7	4.0	2.4	8.0	92	23				40	8	1
9/14	0.3				6.7	4.0	2.4	8.0	90	22				40	4	0
9/21	0.2				6.7	4.0	2.6	8.0	90	22				40	10	0
9/28	0.6				6.6	4.2	2.6	8.3	90	20				40	68	0
0/05	0.3				6.7	4.0	2.4	8.6	90	18				40	29	0
0/13	0.3				6.5	4.3	2.8	8.6	89	17				40	3	0
0/19	0.3				6.7	4.2	2.4	9.3	94	16				40	90	0
0/26	0.3				6.6	4.1	2.6	9.4	91	14				40	110	0
1/02	0.3	5	5.7	7.5	6.6	3.9	2.3	9.5	90	13	26	15	0.04	40	2	0
1/09	0.3				6.6	4.3	2.6	9.5	86	11				40	6	0
1/16	0.3				6.6	4.1	2.3	10.2	90	10				40	9	0
1/23	0.3				6.6	4.0	2.3	9.9	86	9				40	6	0
1/30	0.2				6.6	4.0	2.5	10.1	87	9				40	80	0
2/07	0.2				6.5	4.2	2.4	10.3	89	9				40	6	1
2/14	0.2				6.6	4.2	2.7	10.7	90	8				40	8	0
2/21	0.2				6.6	4.2	2.6	11.0	91	7				40	3	0
2/28	0.2				6.6	4.0	2.5	11.1	87	5				40	8	0
VG	0.3	5	6.0	10.2	6.6	4.2	2.5	10.3	93	12	27	18	0.04	40	19	1
AX	0.6	5	6.5	11.9	6.7	4.4	2.9	13.0	104	25	30	21	0.05	40	110	10
IN	0.2	5	5.6	7.5	6.5	3.9	2.2	7.9	85	11	22	15	0.03	40	0	0

QUABBIN LABORATORY RECORDS 1998
(201) QUABBIN RESERVOIR @ OUTLET BUILDING

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
01/02															AM		1
01/02															PM		0
01/03															PM		0
01/04															PM		0
01/05	0.3				6.5	4.0	2.3	11.2	87	5				40	AM	10	0
01/05															PM		0
01/06															AM	4	0
01/06															PM		2
01/07															AM	3	0
01/07															PM		0
01/08															AM	4	1
01/08															PM		0
01/09															AM		1
01/09															PM		0
01/10															PM		3
01/11															PM		1
01/12	0.3				6.6	4.3	2.5	11.5	88	4				40	AM	7	1
01/12															PM		0
01/13															AM	13	0
01/13															PM		1
01/14															AM	14	0
01/14															PM		0
01/15															AM	3	1
01/15															PM		1
01/16															AM	3	0
01/16															PM		0
01/17															PM		1
01/18															PM		2
01/20	0.3				6.5	3.9	2.1	12.0	92	4				40	AM	3	0
01/20															PM		0
01/21															AM	5	0
01/21															PM		0
01/22															AM	1	0
01/22															PM		0
01/23															AM		0
01/23															PM		0
01/26	0.3				6.6	4.3	2.4	12.9	93	2				40	AM	1	0
01/26															PM		0
01/27															AM	3	0
01/27															PM		0
01/28															AM	2	0
01/28															PM		0
01/29															AM	2	0
01/29															PM		1
01/30															AM		2
01/30															PM		0
01/31															PM		0
02/01															PM		0
02/02	0.3				6.5	4.3	2.9	12.4	92	3				40	AM	0	0
02/02															PM		0
02/03															AM	7	1
02/03															PM		0
02/04															AM	0	0
02/04															PM		0
02/05															AM	5	0
02/05															PM		
02/06															AM		
02/06															PM		0

UABBIN LABORATORY RECORDS 1998
01) QUABBIN RESERVOIR @ OUTLET BUILDING

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
2/07															PM		0
2/08															PM		1
2/09	0.3	5	5.5	10.4	6.5	4.2	2.5	12.5	90	2	22	19	0.04	40	AM	1	0
2/09															PM		0
2/10															AM	1	1
2/10															PM		0
2/11															AM	2	0
2/11															PM		0
2/12															AM	2	0
2/12															PM		0
2/13															AM		0
2/13															PM		0
2/14															PM		0
2/15															PM		1
2/17	0.3				6.5	4.3	2.9	13.0	94	2				40	AM	2	1
2/17															PM		0
2/18															AM	0	0
2/18															PM		0
2/19															AM	3	3
2/19															PM		2
2/20															AM		0
2/20															PM		1
2/21															PM		0
2/22															PM		0
2/23	0.3				6.5	4.0	2.3	13.1	95	2				40	AM	2	2
2/23															PM		0
2/24															AM	2	2
2/24															PM		2
2/25															AM	8	3
2/25															PM		0
2/26															AM	1	1
2/26															PM		1
2/27															AM		0
2/27															PM		0
2/28															PM		0
03/01															PM		0
03/02	0.3				6.5	4.2	2.6	12.8	95	3				40	AM	1	0
03/02															PM		0
03/03															AM	1	0
03/03															PM		0
03/04															AM	1	0
03/04															PM		0
03/05															AM	1	0
03/05															PM		0
03/06															AM		0
03/06															PM		0
03/07															PM		0
03/08															PM		0
03/09	0.3				6.5	4.1	2.6	12.7	97	4				40	AM	0	1
03/09															PM		0
03/10															AM	6	3
03/10															PM		0
03/11															AM	2	1
03/11															PM		0
03/12															AM	5	2
03/12															PM		1
03/13															AM		3
03/13															PM		0

QUABBIN LABORATORY RECORDS 1998
(201) QUABBIN RESERVOIR @ OUTLET BUILDING

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
03/14															PM		2
03/15															PM		0
03/16	0.3				6.5	4.0	2.4	13.0	97	3				40	AM	2	0
03/16															PM		0
03/17															AM	3	1
03/17															PM		0
03/18															AM	0	0
03/18															PM		0
03/19															AM	1	0
03/19															PM		0
03/20															AM		1
03/20															PM		0
03/21															PM		0
03/22															PM		1
03/23	0.3				6.6	4.2	2.5	13.7	99	2				40	AM	2	1
03/23															PM		1
03/24															AM	0	0
03/24															PM		0
03/25															AM	3	0
03/26															AM	0	0
03/26															PM		0
03/27															AM		0
03/27															PM		0
03/28															PM		0
03/29															PM		0
03/30	0.3				6.5	4.2	2.6	12.6	97	4				40	AM	3	0
03/30															PM		0
03/31															AM	4	0
03/31															PM		0
04/01															AM	5	0
04/01															PM		0
04/02															AM	3	0
04/02															PM		0
04/03															AM		0
04/03															PM		0
04/04															PM		0
04/05															PM		0
04/06	0.3				6.5	4.3	2.5	13.0	102	5				40	AM	2	0
04/06															PM		0
04/07															AM	2	0
04/07															PM		0
04/08															AM	6	0
04/08															PM		0
04/09															AM	0	0
04/09															PM		0
04/10															AM		0
04/10															PM		0
04/11															PM		0
04/13	0.3				6.5	4.0	2.4	12.8	103	6				40	AM	2	0
04/13															PM		0
04/14															AM	4	0
04/14															PM		0
04/15															AM	3	0
04/15															PM		0
04/16															AM	1	0
04/16															PM		0
04/17															AM		0
04/17															PM		0

UABBIN LABORATORY RECORDS 1998
01) QUABBIN RESERVOIR @ OUTLET BUILDING

ATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	F•	SPCOND	AM/PM	TOTCOU	FECCOU
4/18															PM		0
4/19															PM		0
4/20															PM		0
4/21	0.3				6.5	4.1	2.6	11.8	97	7				40	AM	2	0
4/22															AM	1	0
4/23															AM	2	0
4/27	0.3				6.5	4.0	2.5	12.0	101	8				40	AM	11	0
4/28															AM	1	0
4/29															AM	2	0
4/30															AM	10	1
5/04	0.3				6.5	4.0	2.4	11.8	100	8				40	AM	4	0
5/05															AM	5	0
5/06															AM	8	0
5/07															AM	8	0
5/11	0.3				6.6	4.2	2.6	11.6	100	9				40	AM	8	0
5/12															AM	18	0
5/13															AM	3	0
5/14															AM	4	0
5/18	0.3	5	6.4	9.6	6.6	4.0	2.3	11.2	97	9	28	19	0.03	40	AM	3	0
5/19															AM	7	0
5/20															AM	4	0
5/21															AM	8	0
5/26	0.2				6.6	4.0	2.3	11.0	97	10				40	AM	2	0
5/27															AM	2	0
5/28															AM	1	0
6/01	0.3				6.6	4.1	2.6	11.0	99	11				40	AM	6	0
6/02															AM	5	0
6/03															AM	4	0
6/04															AM	5	0
6/08	0.3				6.5	4.2	2.6	11.1	100	11				40	AM	0	0
6/09															AM	4	0
6/10															AM	6	0
6/11															AM	5	0
6/15	0.3				6.6	4.0	2.6	11.2	101	11				40	AM	3	0
6/16															AM	4	0
6/18															AM	5	0
6/22	0.3				6.5	4.0	2.4	10.8	100	12				40	AM	3	0
6/23															AM	8	0
6/29	0.3				6.6	4.0	2.4	11.0	102	12				40	AM	8	0
6/30															AM	5	0
7/01															AM	5	0
7/06	0.3				6.6	3.9	2.5	10.8	100	12				40	AM	7	0
7/07															AM	3	0
7/08															AM	5	0
7/09															AM	3	0
7/13	0.3				6.5	4.0	2.5	11.4	103	11				40	AM	8	0
7/14															AM	11	0
7/15															AM	3	0
7/16															AM	4	0
7/20	0.3				6.5	4.2	2.6	11.1	105	13				40	AM	4	0
7/21															AM	7	0
7/22															AM	2	0
7/23															AM	3	0
7/27	0.3				6.6	4.1	2.5	10.7	101	13				40	AM	1	0
7/28															AM	3	0
7/29															AM	2	0
7/30															AM	50	0
8/03	0.3				6.5	4.2	2.7	10.5	99	13				40	AM	50	0

QUABBIN LABORATORY RECORDS 1998
(201) QUABBIN RESERVOIR @ OUTLET BUILDING

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
08/04															AM	110	0
08/05															AM	90	0
08/06															AM	30	0
08/10	0.3	5	6.3	11.7	6.5	4.1	2.7	10.6	102	14	30	21	0.04	40	AM	130	0
08/11															AM	140	0
08/12															AM	70	0
08/13															AM	60	0
08/17	0.3				6.5	4.0	2.6	10.6	102	14				40	AM	40	0
08/18															AM	80	0
08/19															AM	100	0
08/20															AM	60	0
08/24	0.3				6.5	4.2	2.9	10.6	100	13				40	AM	90	0
08/25															AM	70	0
08/26															AM	40	0
08/27															AM	50	0
08/31	0.3				6.5	4.0	2.7	10.4	100	14				40	AM	90	0
09/01															AM	30	0
09/02															AM	60	0
09/03															AM	100	0
09/08	0.3				6.5	4.0	2.5	9.0	87	14				40	AM	10	0
09/09															AM	110	0
09/10															AM	120	0
09/14	0.3				6.5	4.1	2.7	10.0	98	15				40	AM	100	0
09/15															AM	100	0
09/16															AM	100	0
09/17															AM	100	0
09/21	0.3				6.5	4.1	2.7	9.8	95	14				40	AM	180	0
09/22															AM	200	0
09/23															AM	30	2
09/24															AM	200	0
09/28	0.3				6.5	4.1	2.7	9.5	94	15				40	AM	30	0
09/29															AM	70	0
09/30															AM	80	0
10/01															AM	20	0
10/05	0.3				6.5	4.0	2.4	8.8	89	16				40	AM	0	0
10/06															AM	20	1
10/07															AM	0	0
10/08															AM	10	1
10/13	0.3				6.4	4.0	2.5	8.7	90	17				40	AM	30	1
10/14															AM	20	0
10/15															AM	90	0
10/16															AM		2
10/17															AM		0
10/18															AM		0
10/19	0.3				6.3	4.1	2.3	9.4	93	15				40	AM	10	0
10/20															AM	40	0
10/21															AM	0	0
10/22															AM	30	0
10/23															AM		1
10/24															AM		0
10/25															AM		0
10/26	0.3				6.5	4.1	2.7	9.2	91	15				40	AM	40	
10/27															AM	30	
10/28															AM	30	
10/29															AM	10	0
10/30															AM		
10/31															AM		
11/01															AM		

UABBIN LABORATORY RECORDS 1998
01) QUABBIN RESERVOIR @ OUTLET BUILDING

ATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
/02	0.3	5	6.2	7.3	6.5	3.9	2.4	9.2	87	13	25	15	0.04	40	AM	2	0
/02															PM		0
/03															AM	50	1
/03															PM		0
/04															AM	20	0
/04															PM		2
/05															AM	20	1
/05															PM		1
/06															AM		0
/06															PM		0
/07															PM		0
/08															PM		0
/09	0.3				6.5	4.3	2.6	9.2	85	12				40	AM	10	1
/09															PM		0
/10															AM	2	0
/10															PM		0
/11															PM		0
/12															AM	4	0
/12															PM		0
/13															AM		0
/13															PM		1
/14															PM		0
/15															PM		0
/16	0.3				6.5	4.1	2.3	10.6	96	11				40	AM	4	0
/16															PM		0
/17															AM	7	0
/17															PM		0
/18															AM	10	0
/18															PM		0
/19															AM	0	0
/19															PM		0
/20															AM		0
/20															PM		0
/21															PM		0
/22															PM		0
/23	0.3				6.4	3.9	2.2	9.3	84	11				40	AM	7	0
/23															PM		0
/24															AM	7	0
/24															PM		0
/27															AM		0
/27															PM		0
/28															PM		0
/29															PM		1
/30	0.2				6.5	4.0	2.6	9.6	85	10				40	AM	11	0
/30															PM		0
2/01															AM	11	0
2/01															PM		0
2/02															AM	17	1
2/02															PM		0
2/03															AM	7	0
2/03															PM		0
2/04															AM		0
2/04															PM		0
2/05															PM		0
2/06															PM		0
2/07	0.3				6.5	4.2	2.6	10.3	91	10				40	AM	13	1
2/07															PM		1
2/08															AM	7	0

QUABBIN LABORATORY RECORDS 1998
(201) QUABBIN RESERVOIR @ OUTLET BUILDING

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	AM/PM	TOTCOLI	FECCOLI
12/08															PM		0
12/09															AM	4	0
12/09															PM		0
12/10															AM	1	0
12/10															PM		0
12/11															AM	7	0
12/11															PM		1
12/12															PM		0
12/13															PM		0
12/14	0.3				6.5	4.2	2.6	11.4	96	8				40	AM	8	1
12/14															PM		0
12/15															AM	5	1
12/15															PM		0
12/16															AM		0
12/16															PM		0
12/17															AM	LA	0
12/17															PM		0
12/18															AM		0
12/18															PM		0
12/19															PM		0
12/20															PM		0
12/21	0.2				6.5	4.1	2.5	10.6	92	9				40	AM	2	1
12/21															PM		
12/22															AM	1	0
12/22															PM		0
12/23															AM	2	0
12/23															PM		0
12/26															PM		0
12/27															PM		0
12/28	0.2				6.5	4.1	2.7	10.5	87	7				40	AM	4	0
12/28															PM		0
12/29															AM	3	0
12/29															PM		0
12/30															AM	2	0
12/30															PM		
AVG.	0.3	5	6.1	9.8	6.5	4.1	2.5	11.1	96	9	26	19	0.04	40		21	
MAX.	0.3	5	6.4	11.7	6.6	4.3	2.9	13.7	105	17	30	21	0.04	40		200	
MIN.	0.2	5	5.5	7.3	6.3	3.9	2.1	8.7	84	2	22	15	0.03	40		0	

QUABBIN LABORATORY RECORDS 1998
211) WEST BR. OF SWIFT RIVER -- RT. 202

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/12	0.4				6.0	3.5	1.6	12.9	88	0				42	41	0
01/26	0.3				6.0	3.3	1.4	13.1	90	0				45	68	0
02/09	0.3	8	10.2	12.4	6.3	4.5	2.4	13.0	89	0	40	32	0.06	58	70	0
02/23	0.3				6.1	3.3	1.8	12.8	90	1				45	50	1
03/09	8.0				5.9	3.3	1.4	12.5	90	2				43	120	54
03/23	0.4				6.2	3.7	1.7	13.6	96	1				52	65	0
04/06	0.4				6.1	2.9	1.0	12.4	95	4				52	80	1
04/21	0.4				5.9	2.8	1.3	11.2	90	6				48	100	35
05/04	0.4				6.2	3.8	2.2	10.2	90	10				53	500	0
05/18	0.3	15	10.9	9.5	6.4	4.2	2.6	9.8	89	11	42	31	0.06	52	350	7
06/01	0.8				5.8	3.1	1.3	9.1	90	15				37	1200	200
06/15	0.4				5.6	2.5	0.6	9.4	91	14				33	500	40
06/29	0.3				6.2	4.2	2.5	9.2	93	16				48	600	20
07/13	0.3				6.4	5.2	3.5	9.0	89	15				53	700	0
07/27	0.5				6.6	6.7	4.9	9.1	90	15				80	300	10
08/10	0.4	18	17.0	13.8	6.7	7.6	6.0	8.5	91	19	63	45	0.22	82	100	20
08/24	0.5				6.6	6.9	5.2	8.5	88	17				72	400	280
09/08	0.3				6.6	8.2	6.7	8.8	87	15				88	300	60
09/21	0.3				6.6	9.0	7.5	8.5	84	15				103	270	0
10/05	0.3				6.6	8.3	6.6	10.7	86	6				92	280	0
10/19	0.2				6.1	3.5	1.6	9.7	90	12				50	300	7
11/02	0.2	13	10.0	9.1	6.3	4.5	2.5	10.7	88	7	44	29	0.09	60	100	1
11/16	0.3				6.2	3.5	1.8	11.6	91	5				52	80	1
11/30	0.2				6.0	3.4	1.7	11.5	90	5				45	120	1
12/14	0.2				6.2	3.4	1.6	13.2	93	1				50	120	3
12/28	0.2				6.2	3.8	2.1	12.8	90	1				50	150	2
AVG.	0.6	14	12.0	11.2	6.2	4.6	2.8	10.8	90	8	47	34	0.11	57	268	29
MAX.	8.0	18	17.0	13.8	6.7	9.0	7.5	13.6	96	19	63	45	0.22	103	1200	280
MIN.	0.2	8	10.0	9.1	5.6	2.5	0.6	8.5	84	0	40	29	0.06	33	41	0

QUABBIN LABORATORY RECORDS 1998
(213) MIDDLE BR. OF SWIFT RIVER @ GATE #30

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/12	0.4				6.0	4.1	2.0	11.0	75	0				60	80	10
01/26	0.3				5.9	4.3	2.1	11.2	77	0				62	70	1
02/09	0.3	20	15.8	13.7	6.2	6.3	4.4	11.1	78	1	51	41	0.13	78	90	6
02/23	0.3				6.2	5.0	3.1	11.6	82	1				62	50	4
03/09	3.0				6.1	4.5	2.5	11.1	83	3				82	400	120
03/23	0.3				6.2	4.5	2.4	11.9	84	1				75	60	1
04/06	0.4				6.2	6.0	4.0	10.2	80	5				78	110	2
04/21	0.6				6.1	5.9	4.0	8.4	71	8				55	100	68
05/04	0.8				6.2	7.5	5.7	6.4	62	14				67	450	30
05/18	0.7	38	15.5	12.1	6.3	8.3	6.6	6.2	64	17	55	38	0.30	73	250	40
06/01	1.0				6.0	6.5	4.4	4.1	42	17				82	TNTC	2000
06/15	0.6				5.9	4.5	2.5	5.6	56	16				43	450	220
06/29	0.9				6.1	8.1	6.2	3.5	37	19				65	150	20
07/13	0.9				6.1	9.1	7.4	5.7	61	19				73	60	30
07/27	1.3				6.2	13.9	12.0	2.9	32	20				95	50	10
08/10	0.9	65	20.1	19.5	6.4	15.1	13.1	3.0	34	22	81	53	0.82	100	100	30
08/24	0.9				6.2	15.7	14.2	3.6	39	19				102	600	590
09/08	0.9				6.3	15.6	13.6	4.9	51	18				102	160	40
09/21	0.9				6.2	15.3	13.5	3.4	36	18				100	90	10
10/05	1.0				6.2	12.3	10.3	4.8	42	10				92	140	50
10/19	0.6				6.0	6.6	4.5	6.4	59	12				72	150	13
11/02	0.8	43	14.5	13.2	6.3	9.0	7.1	7.2	59	7	59	40	0.35	77	19	1
11/16	0.7				6.2	7.4	5.6	9.4	73	5				70	40	1
11/30	0.5				6.1	5.6	3.7	8.8	67	4				60	50	8
12/14	0.6				6.2	7.4	5.5	10.2	74	2				67	110	0
12/28	0.6				6.1	8.6	6.7	9.1	64	1				78	100	0
AVG.	0.8	42	16.5	14.6	6.2	8.4	6.4	7.4	61	10	62	43	0.40	76	383	127
MAX.	3.0	65	20.1	19.5	6.4	15.7	14.2	11.9	84	22	81	53	0.82	102	TNTC	2000
MIN.	0.3	20	14.5	12.1	5.9	4.1	2.0	2.9	32	0	51	38	0.13	43	19	0

6\1 FECAL COLIFORM RESULT (WITH THE AVERAGE YEARLY INCREASE OF 301%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVG.

QUABBIN LABORATORY RECORDS 1998
(216) EAST BR. OF SWIFT RIVER @ RT. 32A

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/12	0.5				6.2	3.8	2.0	13.2	90	0				55	100	8
01/26	0.4				6.3	4.0	2.3	13.0	91	1				62	50	3
02/09	0.4	32	13.1	12.8	6.4	5.2	3.6	13.1	90	0	49	34	0.15	68	50	26
02/23	0.3				6.3	3.3	1.7	12.2	88	2				58	50	2
03/09	4.0				6.2	3.4	1.8	12.6	94	3				52	120	31
03/23	0.4				6.3	3.7	2.0	13.2	95	2				57	65	2
04/06	0.4				6.3	3.4	1.5	12.2	98	6				53	100	2
04/21	0.6				6.3	3.5	1.7	10.4	90	9				52	70	30
05/04	0.6				6.6	4.3	2.6	9.8	95	14				57	400	0
05/18	0.5	48	12.2	8.0	6.7	5.6	3.7	9.2	93	16	47	28	0.25	58	260	7
06/01	2.0				6.4	5.0	3.1	8.9	92	17				53	TNTC	1000
06/15	0.8				6.2	3.9	2.2	9.0	91	16				40	400	230
06/29	0.8				6.7	5.9	4.0	8.6	92	19				55	350	20
07/13	0.5				6.7	6.4	4.5	8.3	90	20				58	200	0
07/27	0.6				6.9	7.7	6.0	9.0	94	18				65	300	40
08/10	0.7	43	11.9	13.6	7.0	8.1	6.2	8.4	95	22	57	35	0.55	65	300	60
08/24	0.5				7.0	8.6	7.1	8.6	92	19				67	400	150
09/08	0.3				7.1	8.8	7.0	9.0	93	17				70	200	10
09/21	0.3				7.0	9.9	8.4	8.5	89	18				70	140	90
10/05	0.3				7.0	9.0	7.3	10.7	90	8				70	170	10
10/19	0.4				6.7	6.0	4.1	9.8	93	13				70	230	4
11/02	0.4	42	11.2	12.2	6.8	6.5	4.9	11.0	91	7	54	33	0.22	70	100	6
11/16	0.6				6.8	6.8	5.1	11.2	90	6				70	110	1
11/30	0.7				6.7	5.2	3.4	11.7	91	5				68	200	4
12/14	0.5				6.7	6.3	4.7	12.4	90	2				70	120	4
12/28	0.5				6.6	5.7	3.9	13.0	89	0				72	120	3
AVG	0.7	41	12.1	11.7	6.6	5.8	4.0	10.7	92	10	52	33	0.29	62	415	67
MAX	4.0	48	13.1	13.6	7.1	9.9	8.4	13.2	98	22	57	35	0.55	72	TNTC	1000
MIN	0.3	32	11.2	8.0	6.2	3.3	1.5	8.3	88	0	47	28	0.15	40	50	0

6/1 FECAL COLIFORM RESULT (WITH THE YEARLY AVERAGE INCREASE OF 619%)WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVG.

QUABBIN LABORATORY RECORDS 1998
BOAT COVE BROOK -- NEAR MOUTH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/12	1.2				6.9	12.0	9.8	12.8	88	0				57	65	2
01/26	1.8				6.9	10.9	8.8	13.2	90	0				52	55	34
02/09	0.5	23	5.4	22.9	7.0	16.2	14.5	12.9	88	0	54	41	0.12	68	60	4
02/23	0.7				7.0	12.9	11.0	12.8	90	1				53	50	3
03/09	6.0				6.8	9.6	7.8	12.0	92	4				42	60	10
03/23	1.0				7.1	10.7	8.8	12.9	93	2				50	40	0
04/06	0.5				7.0	14.0	12.3	12.1	94	5				58	50	0
04/21	0.7				7.0	15.3	13.7	11.6	93	6				57	21	3
05/04	0.4				7.2	19.2	17.2	9.6	89	12				62	100	6
05/18	0.4	40	5.0	23.8	7.3	21.9	20.0	9.2	87	13	59	36	0.22	63	210	0
06/01	0.9				7.2	19.2	17.4	8.2	88	19				62	1000	500
06/15	0.8				7.2	20.9	18.9	8.8	89	16				60	300	40
06/29	0.8				7.4	39.3	37.2	8.4	87	17				93	350	10
11/16	0.6				7.3	23.2	21.0	11.2	90	6				87	31	6
11/30	0.4				7.2	20.1	18.2	11.0	88	6				85	50	0
12/14	0.5				7.2	20.4	18.5	11.2	83	3				88	30	3
12/28	0.6				7.2	22.5	20.7	12.6	86	0				90	120	8
AVG	1.0	32	5.2	23.4	7.1	18.1	16.2	11.2	89	6	57	39	0.17	66	152	37
MAX	6.0	40	5.4	23.8	7.4	39.3	37.2	13.2	94	19	59	41	0.22	93	1000	500
MIN	0.4	23	5.0	22.9	6.8	9.6	7.8	8.2	83	0	54	36	0.12	42	21	0

QUABBIN LABORATORY RECORDS 1998
GATES BROOK @ MOUTH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/12	0.3				5.2	1.7	0.1	12.8	90	1				28	60	1
01/26	0.3				5.3	1.7	0.0	13.1	92	1				28	27	1
02/09	0.2	7	5.2	9.9	5.2	1.5	-0.2	13.0	91	1	25	21	0.04	28	41	0
02/23	0.3				5.2	1.6	0.2	13.0	94	2				28	50	0
03/09	8.0				5.2	2.0	0.0	12.4	95	4				23	40	9
03/23	0.2				5.3	2.2	0.4	12.7	92	2				27	35	0
04/06	0.3				5.1	1.6	-0.1	12.6	98	5				27	90	0
04/21	0.3				5.3	1.6	-0.1	11.8	92	5				25	100	0
05/04	0.2				5.3	1.7	0.2	10.7	94	10				27	200	1
05/18	0.3	10	4.4	8.2	5.4	1.6	0.0	10.6	96	11	29	20	0.04	27	150	2
06/01	0.4				5.6	2.1	0.4	9.5	92	14				27	800	110
06/15	0.3				5.4	2.0	0.1	9.6	91	13				23	300	10
06/29	0.3				5.4	1.9	0.3	9.5	94	15				27	350	10
07/13	0.2				5.7	2.0	0.5	9.4	93	15				28	240	10
07/27	0.3				5.8	2.4	0.6	9.0	91	16				28	350	0
08/10	0.2	10	5.0	8.2	6.0	2.6	1.2	8.4	90	19	39	27	0.07	28	160	30
08/24	0.3				6.0	2.9	1.1	8.5	89	18				28	500	180
09/08	0.2				6.3	3.5	1.9	8.5	86	16				28	360	30
09/21	0.2				6.2	3.9	2.4	8.0	82	17				28	500	0
10/05	0.2				6.3	3.4	1.7	10.4	90	9				30	300	30
10/19	0.2				6.0	2.7	1.0	9.6	91	13				30	350	5
11/02	0.2	12	2.6	5.3	6.1	2.8	1.0	11.1	91	7	32	22	0.03	30	80	0
11/16	0.2				6.1	2.8	1.3	11.8	95	6				30	100	0
11/30	0.2				5.7	2.3	0.7	11.4	92	6				28	120	0
12/14	0.2				6.1	2.6	0.9	14.2	103	2				28	60	0
12/28	0.2				5.7	1.8	0.3	12.5	90	2				30	100	0
AVG	0.5	10	4.3	7.9	5.7	2.3	0.6	10.9	92	9	31	23	0.05	28	210	17
MAX	8.0	12	5.2	9.9	6.3	3.9	2.4	14.2	103	19	39	27	0.07	30	800	180
MIN	0.2	7	2.6	5.3	5.1	1.5	0.2	8.0	82	1	25	20	0.03	23	27	0

QUABBIN LABORATORY RECORDS 1998
(211B-X) CADWELL BROOK @ MOUTH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/12	0.3				5.5	2.0	0.2	13.1	92	1				40	24	13
01/26	0.3				5.5	2.3	0.4	12.4	85	0				40	60	34
02/09	0.3	7	6.0	10.9	5.8	2.6	0.9	13.2	90	0	31	26	0.04	38	50	0
02/23	0.3				5.5	1.7	0.1	13.0	91	1				40	40	0
03/09	8.0				5.5	2.3	0.7	12.5	93	3				30	60	15
03/23	0.3				5.6	2.1	0.5	13.8	94	0				38	35	3
04/06	0.3				5.6	2.0	0.5	12.7	97	4				40	80	0
04/21	0.3				5.6	2.3	0.7	12.0	94	5				43	80	0
05/04	0.3				5.9	2.1	0.7	10.6	94	10				40	300	11
05/18	0.2	10	7.7	8.9	5.9	2.5	0.6	11.2	101	11	34	25	0.05	40	450	8
06/01	0.5				6.1	3.2	1.5	9.5	94	15				33	1100	600
06/15	0.3				5.7	2.2	0.8	9.6	91	13				43	300	20
06/29	0.3				6.2	2.7	1.2	9.3	94	16				40	200	0
07/13	0.2				6.2	3.6	1.8	9.2	91	15				38	400	100
07/27	0.2				6.4	4.0	2.4	9.3	92	15				35	210	20
08/10	0.2	7	5.1	9.2	6.7	5.9	4.2	8.6	90	18	39	27	0.05	35	200	80
08/24	4.7				6.6	5.7	4.2	8.8	91	17				35	2000	1200
09/08	0.2				6.7	6.1	4.3	9.0	89	15				33	380	20
09/21	0.2				6.8	7.0	5.2	8.8	89	16				35	100	30
10/05	0.2				6.7	6.3	4.5	10.9	90	7				38	210	10
10/19	0.2				6.2	2.8	1.3	9.8	93	13				47	350	7
11/02	0.2	15	6.0	7.0	6.4	3.6	2.0	11.1	91	7	37	27	0.04	42	100	2
11/16	0.2				6.3	3.3	1.3	11.4	89	5				50	50	3
11/30	0.2				5.9	2.0	0.5	11.6	93	6				50	100	2
12/14	0.2				6.1	2.6	1.0	12.4	90	2				45	50	0
12/28	0.2				6.1	3.3	1.6	13.0	91	1				45	80	1
AVG.	0.7	10	6.2	9.0	6.1	3.3	1.7	11.0	92	8	35	26	0.05	40	270	84
MAX	8.0	15	7.7	10.9	6.8	7.0	5.2	13.8	101	18	39	27	0.05	50	2000	1200
MIN	0.2	7	5.1	7.0	5.5	1.7	0.1	8.6	85	0	31	25	0.04	30	24	0

QUABBIN LABORATORY RECORDS 1998
(211A) ATHERTON BROOK @ RT. 202

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/12	0.3				5.5	2.3	0.4	12.9	91	1				40	40	1
01/26	0.2				5.6	2.4	0.4	12.8	90	1				55	55	0
02/09	0.2	12	8.0	9.7	5.9	2.4	0.9	13.1	90	0	33	28	0.04	42	60	0
02/23	0.2				5.6	2.2	0.4	12.6	91	2				42	36	0
03/09	5.0				5.2	1.6	-0.4	12.5	93	3				32	40	15
03/23	0.2				5.5	2.5	0.5	13.2	93	1				38	55	0
04/06	0.3				5.6	2.0	0.0	12.6	97	4				40	60	0
04/21	0.2				5.5	1.8	0.3	11.2	90	6				40	70	0
05/04	0.2				5.9	2.5	0.8	10.7	93	9				40	350	1
05/18	0.2	18	7.7	7.2	5.9	2.6	1.1	10.2	92	11	34	24	0.05	37	320	0
06/01	0.4				5.6	2.1	0.4	9.6	93	14				42	800	110
06/15	0.3				5.4	1.9	0.2	9.7	92	13				33	300	20
06/29	0.2				5.9	2.7	0.9	9.4	93	15				32	600	0
07/13	0.2				6.1	3.4	1.9	9.2	89	14				32	450	10
07/27	0.2				6.4	5.1	3.4	9.1	88	14				32	270	0
08/10	0.2	28	4.4	7.9	6.7	5.6	3.7	8.4	88	18	42	28	0.12	32	120	0
08/24	0.5				6.4	4.8	3.2	8.7	90	17				32	TNTC	2000
09/08	0.6				6.6	5.3	3.8	8.7	86	15				32	440	0
09/21	0.2				6.7	7.0	5.2	8.2	84	17				32	500	0
10/05	0.2				6.8	7.1	5.3	10.5	87	7				33	110	0
10/19	0.2				6.0	3.2	1.5	9.8	90	12				47	300	8
11/02	0.2	20	7.2	6.8	6.4	4.4	2.7	10.8	89	7	40	29	0.06	45	100	3
11/16	0.2				6.2	3.3	1.7	11.0	86	5				45	40	1
11/30	0.2				5.8	2.4	0.6	11.5	92	6				42	60	2
12/14	0.2				6.1	3.4	1.7	12.5	90	2				42	50	1
12/28	0.2				6.1	2.9	1.5	12.8	90	1				40	100	0
AVG.	0.4	20	6.8	7.9	6.0	3.3	1.6	10.8	90	8	37	27	0.07	38	2586	84
MAX.	5.0	28	8.0	9.7	6.8	7.1	5.3	13.2	97	18	42	29	0.12	55	TNTC	2000
MIN.	0.2	12	4.4	6.8	5.2	1.6	-0.4	8.2	84	0	33	24	0.04	32	36	0

8/24 FECAL COLIFORM RESULT (WITH THE YEARLY AVERAGE INCREASE OF 3,096%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVG.

QUABBIN LABORATORY RECORDS 1998
(212) HOP BROOK – GATE #22

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/12	0.4				6.5	4.6	2.6	13.0	89	0				92	50	3
01/26	0.3				6.5	4.9	3.2	13.0	89	0				113	60	1
02/09	0.4	10	19.0	19.0	6.6	7.0	5.5	12.9	88	0	63	56	0.15	100	55	13
02/23	0.3				6.5	4.8	3.1	12.8	90	1				83	50	9
03/09	10.0				6.2	4.5	2.9	12.4	90	2				58	70	29
03/23	0.3				6.5	4.7	2.8	13.2	93	1				123	40	0
04/06	0.4				6.5	5.2	3.6	12.4	94	4				83	65	1
04/21	0.5				6.6	6.1	4.5	11.0	91	7				80	60	22
05/04	0.4				6.7	6.9	5.1	10.2	92	11				83	200	22
05/18	0.5	22	18.0	11.9	6.8	7.6	5.9	9.4	89	13	62	49	0.22	88	200	18
06/01	1.4				6.5	6.4	4.8	9.2	89	14				65	1500	700
06/15	0.6				6.5	5.9	4.1	9.2	89	14				60	350	180
06/29	0.8				6.8	8.4	6.6	8.9	92	17				80	300	70
07/13	1.4				6.8	10.1	8.4	8.6	89	17				90	300	120
07/27	2.5				7.0	13.4	11.6	8.7	90	17				108	180	20
08/10	2.2	55	23.4	18.5	7.0	14.0	12.3	8.1	88	20	88	63	1.22	110	500	80
08/24	4.2				6.9	15.0	13.1	8.3	89	19				110	600	260
09/08	3.2				7.0	14.8	12.8	8.8	89	16				103	350	20
09/21	2.2				6.9	15.1	13.7	7.7	79	17				100	400	0
10/05	2.2				6.9	13.4	11.7	10.1	83	7				102	190	20
10/19	1.2				6.7	9.1	7.4	9.4	87	12				110	250	25
11/02	1.4	28	26.6	16.5	6.8	9.3	7.7	10.6	87	7	80	62	0.66	122	32	2
11/16	1.0				6.8	8.6	7.1	11.4	87	4				102	39	0
11/30	0.9				6.7	7.0	5.3	11.6	91	5				93	40	3
12/14	0.8				6.7	8.1	6.4	12.7	89	1				102	50	1
12/28	0.6				6.7	8.7	7.2	12.7	87	0				93	50	0
AVG.	1.5	29	21.8	16.5	6.7	8.6	6.9	10.6	89	9	73	58	0.56	94	230	62
MAX.	10.0	55	26.6	19.0	7.0	15.1	13.7	13.2	94	20	88	63	1.22	123	1500	700
MIN.	0.3	10	18.0	11.9	6.2	4.6	2.6	7.7	79	0	62	49	0.15	58	32	0

UABBIN LABORATORY RECORDS 1998
212-X) HOP BROOK @ MOUTH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
1/12	0.4				6.5	4.9	3.2	13.3	91	0				85	43	3
1/26	0.3				6.6	5.4	3.9	13.2	90	0				100	50	0
2/09	0.3	10	17.1	19.0	6.7	6.8	5.2	13.3	91	0	55	45	0.12	88	70	14
2/23	0.3				6.6	5.3	3.9	13.2	93	1				77	35	9
3/09	10.0				6.3	4.3	2.2	12.8	93	2				53	70	25
3/23	0.3				6.6	5.2	3.4	13.6	96	1				112	45	1
4/06	0.3				6.6	5.8	4.3	12.6	97	4				77	50	5
4/21	0.4				6.7	5.8	4.2	11.2	90	6				70	30	11
5/04	0.4				6.8	7.0	5.4	10.4	94	11				75	250	23
5/18	0.4	20	16.6	11.9	6.9	7.6	5.9	9.8	90	12	58	44	0.18	80	150	10
6/01	1.5				6.7	6.3	4.7	9.6	93	14				62	1200	600
6/15	0.7				6.7	6.1	4.5	9.5	92	14				55	250	100
6/29	0.7				6.9	8.3	6.5	9.3	96	17				73	150	50
7/13	0.9				6.9	10.0	8.1	8.9	90	16				80	150	20
7/27	1.3				7.1	13.0	11.3	9.3	94	16				93	140	10
8/10	0.9	38	20.3	17.8	7.2	13.8	12.0	8.7	95	20	75	53	0.65	98	200	0
8/24	1.5				7.0	13.4	11.9	8.8	92	18				92	550	260
9/08	0.6				7.2	13.8	11.9	9.0	91	16				90	130	0
9/21	0.3				7.1	14.6	13.0	8.7	90	17				83	230	20
0/05	0.4				7.2	13.4	11.7	11.1	91	7				88	110	0
0/19	0.6				7.0	9.4	7.8	9.7	90	12				100	150	5
1/02	0.6	22	22.1	16.0	7.0	9.5	8.1	11.2	92	7	70	55	0.37	108	40	6
1/16	0.6				7.0	8.9	7.4	11.6	89	4				95	23	8
1/30	0.5				6.9	7.2	5.6	11.9	93	5				90	40	0
2/14	0.5				6.9	8.2	6.6	12.7	89	1				92	40	1
2/28	0.5				6.8	8.7	7.2	13.2	90	0				88	50	7
VG.	1.0	23	19.0	16.2	6.8	8.6	6.9	11.0	92	9	65	49	0.33	85	163	46
AX	10.0	38	22.1	19.0	7.2	14.6	13.0	13.6	97	20	75	55	0.65	112	1200	600
IN	0.3	10	16.6	11.9	6.3	4.3	2.2	8.7	89	0	55	44	0.12	53	23	0

QUABBIN LABORATORY RECORDS 1998
(215A) WEST BR. OF FEVER BROOK – WOMENS FED.

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/12	0.5				5.8	3.3	1.2	12.2	83	0				72	80	2
01/26	0.4				5.8	3.3	1.3	12.4	87	1				73	30	8
02/09	0.4	40	16.7	14.6	6.0	3.6	1.8	12.0	84	1	58	45	0.18	78	60	2
02/23	0.3				5.9	3.0	1.1	11.8	85	2				70	80	1
03/09	2.5				5.8	2.9	1.4	11.8	88	3				52	100	3
03/23	0.3				5.8	2.6	0.8	12.6	89	1				62	37	0
04/06	0.4				5.9	2.8	1.0	11.2	90	6				62	60	3
04/21	0.6				6.0	3.2	1.5	9.3	82	10				68	80	9
05/04	0.5				6.1	4.5	2.9	8.3	82	15				70	200	4
05/18	0.6	75	16.0	10.7	6.2	4.9	2.9	7.3	77	18	60	36	0.48	70	310	10
06/01	1.3				6.0	5.0	3.1	7.6	80	18				60	600	250
06/15	0.6				5.8	3.5	1.6	7.9	81	17				68	250	80
06/29	0.9				6.1	6.7	4.6	6.0	67	21				63	60	10
07/13	0.7				6.1	6.7	4.8	5.9	64	20				62	120	50
07/27	0.9				6.3	9.0	7.2	6.0	64	19				70	160	30
08/10	0.8	75	18.3	13.7	6.5	9.7	7.9	5.8	66	22	72	40	0.68	72	500	60
08/24	0.8				6.4	9.1	7.5	6.2	66	19				72	200	90
09/08	0.9				6.5	9.8	8.2	6.4	66	17				72	340	40
10/05	0.7				6.5	10.1	8.2	7.6	67	10				77	130	20
10/19	0.8				6.2	6.7	4.8	8.0	76	13				70	150	12
11/02	0.7	65	16.8	10.3	6.3	6.4	4.6	8.9	75	8	65	37	0.53	77	24	1
11/16	0.8				6.3	6.6	4.8	10.4	84	6				78	39	1
11/30	0.7				6.1	5.2	3.8	10.8	84	5				80	25	0
12/14	0.7				6.2	5.1	3.3	11.0	82	3				88	100	0
12/28	0.8				6.2	6.5	5.0	11.2	81	2				97	60	1
AVG.	0.7	64	17.0	12.3	6.1	5.6	3.8	9.1	78	10	64	40	0.47	71	152	27
MAX	2.5	75	18.3	14.6	6.5	10.1	8.2	12.6	90	22	72	45	0.68	97	600	250
MIN	0.3	40	16.0	10.3	5.8	2.6	0.8	5.8	64	0	58	36	0.18	52	24	0

QUABBIN LABORATORY RECORDS 1998
(215) EAST BR. OF FEVER BROOK – ON WEST RD.

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	F-	SPCOND	TOTCOLI	FECCOLI
01/12	0.5				5.5	2.4	0.4	11.4	80	1				62	60	8
01/26	0.4				5.5	2.7	1.1	11.8	83	1				82	70	4
02/09	0.4	45	19.7	14.5	5.6	3.0	1.2	10.9	79	2	61	41	0.20	83	70	0
02/23	0.3				5.5	2.5	1.0	11.5	86	3				70	100	1
03/09	1.0				5.6	2.4	0.7	11.3	87	4				63	110	0
03/23	0.3				5.5	2.5	0.6	12.6	91	2				67	50	0
04/06	0.4				5.6	2.5	0.9	10.7	86	6				72	120	0
04/21	0.5				5.7	2.9	1.3	9.0	81	11				82	100	22
05/04	0.5				5.8	3.1	1.4	7.8	78	16				80	600	12
05/18	0.6	48	17.9	10.7	5.9	3.5	1.9	7.5	79	18	56	37	0.35	77	500	7
06/01	0.9				5.7	3.7	2.1	6.6	69	18				87	TNTC	1000
06/15	0.7				5.5	3.0	1.4	6.8	71	18				75	200	30
06/29	0.6				5.6	3.5	1.9	5.3	59	21				65	60	10
07/13	0.5				5.7	4.0	2.4	6.3	69	20				77	150	30
07/27	0.7				5.8	4.7	2.9	5.9	62	18				80	170	30
08/10	0.8	95	22.8	15.0	6.0	5.6	3.7	5.2	57	20	77	46	0.95	83	300	70
08/24	0.9				5.9	5.9	4.3	5.7	60	18				88	400	250
09/08	0.9				6.2	6.7	5.3	6.9	69	16				85	720	210
10/05	0.7				6.2	8.7	7.0	6.8	57	8				88	270	10
10/19	0.5				6.0	5.3	3.3	7.2	68	13				98	200	23
11/02	0.5	65	22.3	10.5	6.1	4.8	2.9	8.6	73	8	76	50	0.43	95	120	1
11/16	0.5				6.2	5.8	3.9	10.0	80	6				100	60	18
11/30	0.6				6.0	5.3	3.6	9.3	73	5				110	50	3
12/14	0.7				6.1	6.0	4.5	10.2	76	3				120	110	3
12/28	0.6				5.9	5.6	3.7	9.8	73	3				130	150	0
AVG.	0.6	63	20.7	12.7	5.8	4.2	2.5	8.6	74	10	68	44	0.48	85	445	70
MAX.	1.0	95	22.8	15.0	6.2	8.7	7.0	12.6	91	21	77	50	0.95	130	TNTC	1000
MIN.	0.3	45	17.9	10.5	5.5	2.4	0.4	5.2	57	1	56	37	0.20	62	50	0

6/1 FECAL COLIFORM RESULT (WITH THE YEARLY AVERAGE INCREASE OF 639%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVG.

QUABBIN LABORATORY RECORDS 1998
(216B) RAND BROOK – RT. 32A

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	FE	SPCOND	TOTCOLI	FECCOLI
01/12	0.6				6.6	6.5	4.7	13.2	90	0				43	60	4
01/26	0.6				6.7	7.4	5.7	13.2	93	1				52	65	4
02/09	0.6	43	8.9	15.6	6.7	8.0	6.2	13.2	90	0	45	33	0.27	57	50	0
02/23	0.4				6.6	5.4	3.5	11.4	82	2				45	40	0
03/09	3.0				6.5	4.7	3.2	12.4	92	3				40	100	8
03/23	0.4				6.6	4.8	2.9	13.0	94	2				42	50	20
04/06	0.5				6.7	5.9	4.1	12.3	99	6				48	40	1
04/21	0.7				6.7	6.2	4.5	10.4	90	9				48	80	5
05/04	0.6				6.9	7.5	5.8	10.0	94	13				50	400	10
05/18	0.7	47	7.9	12.6	7.0	8.6	6.9	9.1	92	16	45	28	0.30	52	250	1
06/01	1.5				6.8	8.6	7.0	9.0	93	17				52	900	40
06/15	1.2				6.9	8.7	7.0	8.6	90	18				43	200	8
06/29	1.2				7.0	10.4	8.6	8.9	93	18				52	260	1
07/13	1.2				6.9	10.8	9.2	8.9	92	17				55	150	
07/27	1.0				7.1	12.9	11.4	8.7	91	18				62	40	
08/10	0.9	37	10.7	16.0	7.2	13.6	12.0	8.3	92	21	60	35	0.40	68	90	
08/24	1.5				7.1	13.7	11.9	8.3	89	19				70	600	40
09/08	0.7				7.2	15.9	14.2	8.8	91	17				75	330	1
09/21	0.6				7.2	15.9	14.0	8.4	88	18				80	250	2
10/05	0.6				7.2	13.6	11.6	10.7	93	9				70	140	
10/19	0.5				6.9	10.3	8.5	9.7	92	13				63	110	1
11/02	0.4	48	8.1	15.5	6.9	10.4	8.6	11.2	92	7	55	31	0.18	67	80	
11/16	0.6				6.9	9.9	8.0	11.6	91	5				67	50	
11/30	0.6				6.8	8.7	6.9	11.9	93	5				62	50	
12/14	0.6				6.8	9.1	7.3	12.6	91	2				62	30	
12/28	0.8				6.7	9.5	7.9	13.1	90	0				62	60	
AVG	0.8	44	8.9	14.9	6.9	9.5	7.8	10.7	91	10	51	32	0.29	57	172	4
MAX	3.0	48	10.7	16.0	7.2	15.9	14.2	13.2	99	21	60	35	0.40	80	900	40
MIN	0.4	37	7.9	12.6	6.5	4.7	2.9	8.3	82	0	45	28	0.18	40	30	

QUABBIN LABORATORY RECORDS 1998
WARE RIVER AND TRIBUTARIES
WARE RIVER @ SHAFT #11A

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
03/16	0.6				5.9	3.3	1.4	13.1	92	1				55	50	0

WARE RIVER @ SHAFT #8

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/05	0.6				6.3	5.0	3.0	13.3	91	0				72	80	5
01/20	0.5				6.1	3.9	1.9	13.1	90	0				70	50	2
02/02	0.5				6.1	4.3	2.1	13.0	89	0				68	100	3
02/17	0.4	38	14.0	10.7	6.0	3.6	2.1	13.6	93	0	53	36	0.15	63	100	2
03/02	0.4				6.0	3.7	1.7	12.6	94	3				60	50	4
03/16	0.5				5.8	2.8	1.0	13.4	94	1				57	60	3
03/30	0.5				6.1	3.5	1.7	10.4	92	10				55	50	0
04/13								10.9	94	9						
04/27	0.6				6.3	4.0	2.2	10.8	93	9				60	140	5
05/11	1.3	85	14.2	12.1	6.2	3.8	2.2	9.8	90	12	49	27	0.60	58	700	40
05/26	1.5				6.5	6.1	4.1	9.6	99	17				68	300	16
06/08	1.5				6.4	5.7	3.7	9.9	98	15				63	220	20
06/22	0.8				5.9	3.3	1.4	7.6	81	19				43	200	60
07/06	0.9				6.2	6.4	4.3	7.4	81	20				60	120	20
07/20	2.5				6.5	8.3	6.3	8.1	93	23				70	190	20
08/03	2.7	110	13.2	11.6	6.5	6.6	4.7	8.2	93	22	65	40	1.60	70	200	50
08/17	2.8				6.6	8.3	6.8	8.0	92	23				72	160	60
08/31	2.5				6.6	8.6	7.0	7.6	84	21				77	1000	210
09/14	1.8				6.6	7.4	5.6	8.2	86	18				80	140	10
09/28	1.7				6.6	6.6	4.8	8.8	92	18				73	190	20
10/13	1.2				6.0	4.8	3.0	8.2	77	13				75	280	40
10/26	1.2				6.4	5.7	4.0	11.1	98	10				70	150	6
11/09	1.3	65	13.5	11.0	6.5	5.9	3.9	12.2	94	4	62	42	0.72	73	190	7
11/23	0.8				6.4	5.0	3.0	12.7	97	4				67	80	7
12/07	0.8				6.4	4.7	2.7	12.4	102	7				70	250	13
12/21	0.7				6.4	5.5	3.5	13.7	96	1				70	120	7
AVG.	1.2	75	13.7	11.4	6.3	5.3	3.5	10.6	92	11	57	36	0.77	67	205	25
MAX.	2.8	110	14.2	12.1	6.6	8.6	7.0	13.7	102	23	65	42	1.60	80	1000	210
MIN.	0.4	38	13.2	10.7	5.8	2.8	1.0	7.4	77	0	49	27	0.15	43	50	0

QUABBIN LABORATORY RECORDS 1998
WARE RIVER AND TRIBUTARIES
(111) QUEEN LAKE @ ROAD CULVERT

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/05	0.4				6.6	6.0	4.3	12.4	90	2				52	120	0
01/20	0.4				6.6	6.2	4.6	12.6	94	3				50	60	18
02/02	0.3				6.6	5.7	3.7	12.6	91	2				50	80	0
02/17	0.4	7	8.2	13.1	6.6	5.9	4.0	13.2	98	3	36	24	0.07	50	120	0
03/02	0.4				6.5	5.0	3.1	12.6	94	3				48	90	3
03/16	0.3				6.5	5.0	3.1	12.8	90	1				48	80	0
03/30	0.4				6.4	4.6	2.6	11.0	93	8				48	80	0
04/13	0.4				6.5	4.7	2.7	12.4	105	8				50	120	0
04/27	0.5				6.5	5.2	3.5	10.7	93	9				48	130	2
05/11	0.5	10	5.6	11.1	6.6	5.2	3.7	9.6	89	12	29	17	0.12	48	500	10
05/26	0.5				6.6	5.5	3.6	8.7	88	16				50	700	5
06/08	0.7				6.6	5.1	3.5	9.3	92	15				50	700	10
06/22	0.7				6.5	5.2	3.7	8.2	93	22				47	320	0
07/06	0.6				6.6	5.5	3.8	8.2	89	20				48	200	0
07/20	0.7				6.6	6.3	4.5	7.6	86	22				50	160	0
08/03	0.7	12	9.2	10.5	6.7	6.2	4.8	8.2	89	20	35	20	0.27	50	170	0
08/17	0.5				6.7	7.2	5.7	7.7	87	22				50	250	0
08/31	0.6				6.6	7.0	5.5	8.4	90	19				50	200	0
09/14	0.9				6.7	7.1	5.2	8.2	84	17				50	300	80
09/28	2.3				6.8	7.6	5.8	8.2	84	17				52	410	0
10/13	0.6				6.7	6.3	4.7	12.0	116	14				50	450	10
10/26	0.5				6.7	6.5	4.9	10.2	90	10				48	170	5
11/09	0.6	15	7.3	9.6	6.7	6.5	4.7	11.6	100	9	38	23	0.12	50	1500	11
11/23	0.6				6.7	5.7	4.0	12.3	94	4				48	200	2
12/07	0.6				6.7	6.2	4.6	11.4	94	7				48	500	0
12/21	0.5				6.7	6.0	4.0	12.6	89	1				50	200	0
AVG	0.6	11	7.6	11.1	6.6	5.9	4.2	10.5	92	11	35	21	0.15	49	300	6
MAX	2.3	15	9.2	13.1	6.8	7.6	5.8	13.2	116	22	38	24	0.27	52	1500	80
MIN	0.3	7	5.6	9.6	6.4	4.6	2.6	7.6	84	1	29	17	0.07	47	160	0

UABBIN LABORATORY RECORDS 1998
/ARE RIVER AND TRIBUTARIES
12) BURNSHIRT RIVER @ WILLIAMSVILLE RD.

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
1/05	0.6				6.1	4.5	2.5	12.6	89	1				65	50	5
1/20	0.4				5.8	2.8	0.7	13.0	89	0				53	75	5
2/02	0.4				5.8	3.2	1.4	12.8	88	0				58	50	0
2/17	0.4	38	10.5	9.3	5.7	2.4	0.4	13.6	96	1	45	26	0.13	53	60	0
3/02	0.3				5.8	2.7	1.1	12.8	93	2				50	50	0
3/16	0.3				5.6	2.1	0.3	12.9	91	1				42	50	0
3/30	0.4				5.8	2.6	1.0	11.2	90	6				42	50	0
4/13	0.4				5.9	2.8	1.0	12.2	103	8				43	80	0
4/27	0.5				6.0	2.6	0.7	10.6	92	9				45	65	0
5/11	0.6	50	13.8	8.4	6.0	2.6	0.9	9.6	89	12	35	15	0.32	45	600	0
5/26	0.8				6.1	3.2	1.3	8.4	87	17				45	50	4
6/08	0.6				6.0	3.3	1.3	9.0	91	16				45	30	0
6/22	0.5				5.7	2.9	0.9	8.2	89	20				38	100	20
7/06	0.5				6.1	3.8	1.8	8.2	89	20				40	30	0
7/20	0.8				6.1	3.8	1.9	6.7	77	23				42	80	20
8/03	1.0	95	10.2	11.9	6.2	4.9	3.1	7.8	85	20	46	20	0.98	42	100	70
8/17	0.7				6.2	5.2	3.4	6.6	75	22				42	170	50
8/31	0.9				6.2	5.7	4.0	7.4	79	19				43	120	50
9/14	1.0				6.3	5.6	3.9	7.4	78	18				43	200	40
9/28	1.0				6.4	5.8	4.3	8.6	89	17				43	300	70
10/13	0.8				6.3	4.5	2.5	8.8	83	13				43	260	10
10/26	0.9				6.2	4.9	3.0	9.3	80	9				48	200	10
11/09	0.6	70	9.0	8.1	6.4	5.2	3.4	11.8	95	6	52	27	0.48	50	240	0
11/23	0.6				6.3	4.5	2.6	11.7	90	4				50	200	1
12/07	0.6				6.3	4.5	2.6	12.4	102	7				50	300	3
12/21	0.6				6.2	3.9	2.0	12.2	91	3				52	100	0
AVG.	0.6	63	10.9	9.4	6.1	3.8	2.0	10.2	88	11	45	22	0.48	47	139	14
MAX	1.0	95	13.8	11.9	6.4	5.8	4.3	13.6	103	23	52	27	0.98	65	600	70
MIN	0.3	38	9.0	8.1	5.6	2.1	0.3	6.6	75	0	35	15	0.13	38	30	0

QUABBIN LABORATORY RECORDS 1998
WARE RIVER AND TRIBUTARIES
(103) BURNSHIRT RIVER @ RT. 62

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/05	0.6				6.0	3.4	1.6	13.2	90	0				58	100	3
01/20	0.4				5.7	2.9	1.1	13.1	90	0				52	80	1
02/02	0.4				5.8	2.7	0.7	12.6	89	1				53	55	3
02/17	0.4	33	11.3	9.9	5.8	2.8	1.0	12.8	88	0	44	27	0.12	52	80	1
03/02	0.3				5.7	2.2	0.5	12.6	91	2				50	50	0
03/16	0.3				5.6	2.5	0.7	13.2	93	1				42	50	0
03/30	0.3				5.8	2.5	0.5	10.7	90	8				42	50	1
04/13	0.4				5.8	2.3	0.4	12.9	109	8				42	100	1
04/27	0.5				6.0	3.1	1.4	10.6	89	8				42	210	1
05/11	0.6	55	11.3	8.9	5.9	2.9	1.3	9.7	90	12	38	19	0.38	42	500	10
05/26	0.7				6.2	3.9	2.3	8.6	87	16				42	500	1
06/08	0.6				6.0	3.3	1.7	8.7	84	14				42	140	10
06/22	0.6				5.7	2.8	1.1	4.7	50	19				38	160	10
07/06	0.7				6.0	3.3	1.6	7.9	85	19				38	70	20
07/20	1.2				6.2	4.9	3.4	7.2	80	21				40	100	30
08/03	1.0	90	9.1	11.6	6.2	4.4	2.6	7.9	85	19	44	21	1.22	40	200	30
08/17	1.2				6.3	5.0	3.2	7.1	79	21				40	300	30
08/31	1.3				6.2	5.4	3.5	7.4	76	17				42	250	20
09/14	1.3				6.3	5.8	4.2	7.9	79	16				42	250	20
09/28	1.0				6.3	5.7	3.9	8.5	88	17				42	250	40
10/13	0.6				6.0	4.1	2.4	8.8	81	12				43	320	0
10/26	0.6				6.2	4.3	2.6	10.0	86	9				42	350	5
11/09	0.7	65	8.3	7.6	6.3	4.5	2.5	11.8	88	3	45	27	0.62	45	360	9
11/23	0.5				6.1	3.5	1.7	12.0	92	4				48	250	5
12/07	0.5				6.1	3.5	1.6	11.4	96	8				50	400	0
12/21	0.5				6.2	4.4	2.5	12.6	89	1				50	200	130
AVG	0.7	61	10.0	9.5	6.0	3.7	1.9	10.2	86	10	43	24	0.59	45	207	15
MAX	1.8	90	11.3	11.6	6.3	5.8	4.2	13.2	109	21	45	27	1.22	58	500	130
MIN	0.3	33	8.3	7.6	5.6	2.2	0.4	4.7	50	0	38	19	0.12	38	50	0

UABBIN LABORATORY RECORDS 1998
'ARE RIVER AND TRIBUTARIES
15) BRIGHAM POND @ OUTLET

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
1/05	0.5				6.0	4.3	2.6	12.6	89	1				48	24	3
1/20	0.5				5.7	3.1	1.0	13.2	90	0				43	55	2
2/02	0.5				5.7	3.1	1.3	12.6	89	1				42	41	0
2/17	0.5	43	8.6	10.8	5.8	2.7	1.0	13.6	96	1	44	23	0.13	47	60	5
3/02	0.4				5.8	2.9	1.2	12.6	91	2				40	50	5
3/16	0.4				5.6	2.5	0.8	12.6	89	1				35	60	0
3/30	0.4				5.8	2.8	1.0	11.4	92	6				37	45	2
4/13	0.5				5.9	3.0	1.3	12.3	109	10				38	40	1
4/27	0.6				6.0	2.9	1.0	10.4	92	10				40	68	7
5/11	0.7	75	9.4	10.8	6.0	2.9	1.3	10.0	92	12	39	14	0.28	38	400	60
5/26	0.7				6.2	4.2	2.2	8.2	88	19				40	300	1
6/08	0.6				6.1	4.2	2.3	8.2	82	16				40	300	0
6/22	0.5				5.6	2.7	0.6	7.3	80	20				32	140	20
7/06	0.5				5.9	4.2	2.4	7.2	81	22				33	40	10
7/20	0.9				6.0	5.0	3.0	5.2	61	24				38	70	10
8/03	1.2	120	11.2	10.7	6.3	5.2	3.7	6.6	77	24	48	19	1.02	40	200	20
8/17	1.2				6.4	5.8	4.3	6.5	77	25				40	100	0
8/31	0.9				6.3	5.3	3.8	6.3	70	21				40	40	0
9/14	0.9				6.3	5.5	3.8	7.0	76	20				40	110	0
9/28	0.9				6.4	4.7	2.9	8.4	90	19				40	40	7
0/13	0.8				6.1	4.7	2.8	8.5	80	13				40	250	0
0/26	0.7				6.1	4.9	3.1	8.7	79	11				47	70	5
1/09	0.8	80	7.9	8.4	6.2	4.3	2.4	10.4	81	5	55	26	0.50	45	50	0
1/23	0.8				6.1	4.5	2.7	10.8	83	4				45	80	0
2/07	0.8				6.1	4.2	2.5	11.0	88	6				43	110	0
2/21	0.6				6.1	3.8	1.7	11.8	88	3				43	50	0
AVG.	0.7	80	9.3	10.2	6.0	4.0	2.2	9.7	85	11	47	21	0.48	41	107	6
MAX.	1.2	120	11.2	10.8	6.4	5.8	4.3	13.6	109	25	55	26	1.02	48	400	60
MIN.	0.4	43	7.9	8.4	5.6	2.5	0.6	5.2	61	0	39	14	0.13	32	24	0

QUABBIN LABORATORY RECORDS 1998
WARE RIVER AND TRIBUTARIES
(116) ASNACOMET POND @ OUTLET

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/05	0.3				6.4	4.1	2.2	11.8	85	2				38	23	0
01/20	0.3				6.3	3.8	2.0	11.8	88	3				37	9	0
02/02	0.3				6.3	3.9	1.9	11.0	82	3				35	14	0
02/17	0.4	7	6.0	9.4	6.3	4.3	2.8	12.2	94	4	28	15	0.06	35	16	0
03/02	0.3				6.2	3.2	1.5	11.7	90	4				32	27	0
03/16	0.4				6.3	3.6	1.8	11.6	86	3				32	8	0
03/30	0.3				6.6	3.6	1.6	12.2	101	7				33	19	0
04/13	0.5				6.3	3.1	1.5	14.6	123	8				33	19	0
04/27	0.4				6.4	3.8	2.1	10.8	95	10				32	12	0
05/11	0.3	7	4.0	12.4	6.4	3.7	2.2	9.5	90	13	22	10	0.05	32	15	3
05/26	0.3				6.4	3.4	1.8	9.0	94	18				32	80	1
06/08	0.3				6.5	3.4	1.7	8.4	87	17				33	13	0
06/22	0.3				6.3	3.4	1.8	8.5	96	22				32	43	2
07/06	0.3				6.4	3.6	1.9	8.2	94	23				32	11	3
07/20	0.3				6.3	3.3	1.5	7.5	89	25				32	40	2
08/03	0.3	7	6.2	9.3	6.3	3.0	1.4	7.6	89	24	27	10	0.06	32	30	1
AVG.	0.3	7	5.4	10.4	6.4	3.6	1.9	10.4	93	12	26	12	0.06	33	24	1
MAX.	0.5	7	6.2	12.4	6.6	4.3	2.8	14.6	123	25	28	15	0.06	38	80	3
MIN.	0.3	7	4.0	9.3	6.2	3.0	1.4	7.5	82	2	22	10	0.05	32	8	0

(116A) ASNACOMET POND @ BEACH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
06/22	0.3				6.3	3.3	1.7	8.2	93	22				32	33	6
07/06	0.3				6.3	3.1	1.3	8.2	94	23				32	2	1
07/20	0.3				6.4	3.4	2.1	7.5	89	25				32	16	1
08/03	0.8	7	6.2	8.7	6.4	3.2	1.8	7.7	92	25			0.05	32	40	6
08/17	0.3				6.5	3.4	1.7	7.5	89	25				32	12	3
AVG.	0.4	7	6.2	8.7	6.4	3.3	1.7	7.8	91	24			0.05	32	21	3
MAX.	0.8	7	6.2	8.7	6.5	3.4	2.1	8.2	94	25			0.05	32	40	6
MIN.	0.3	7	6.2	8.7	6.3	3.1	1.3	7.5	89	22			0.05	32	2	1

UABBIN LABORATORY RECORDS 1998
/ARE RIVER AND TRIBUTARIES
07) WEST BR. OF WARE RIVER @ RT. 62

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
1/05	0.6				5.7	4.2	2.5	8.7	60	0				65	48	1
1/20	0.4				5.7	3.5	1.7	11.2	77	0				52	22	1
2/02	0.4				5.7	3.3	1.6	11.2	77	0				57	23	1
2/17	0.5	42	11.9	14.8	5.8	2.9	1.1	12.0	82	0	47	27	0.17	55	45	0
3/02	0.4				5.8	3.1	1.4	12.0	87	2				48	26	1
3/16	0.3				5.7	2.8	1.3	12.4	87	1				40	50	0
3/30	0.3				5.9	3.1	1.5	11.0	91	7				40	80	1
4/13	0.4				5.8	3.9	2.2	11.9	100	8				43	100	0
4/27	0.5				5.9	3.4	1.6	9.0	76	8				43	200	2
5/11	0.7	80	11.1	11.1	5.9	3.5	1.8	8.2	76	12	41	16	0.38	42	350	30
5/26	0.8				5.9	5.5	3.6	4.1	42	17				48	400	50
6/08	0.9				5.8	5.2	3.4	3.7	36	15				48	120	50
6/22	0.6				5.6	3.3	1.3	4.6	49	19				33	160	10
7/06	0.9				5.7	5.0	3.2	2.6	28	20				42	60	10
7/20	4.8				6.0	11.5	9.4	0.4	5	22				60	170	60
8/03	4.3	130	14.2	11.2	6.1	9.5	7.9	0.7	7	19	64	32	2.00	60	120	70
8/17	5.0				6.0	10.9	8.9	0.4	4	21				68	200	90
8/31	5.0				6.0	12.1	10.1	0.4	4	18				70	300	130
9/14	3.5				6.0	9.7	7.8	0.9	9	17				70	140	60
9/28	2.7				6.0	8.1	6.3	1.7	18	17				70	310	70
0/13	0.9				5.7	4.1	2.1	4.6	42	12				58	270	60
0/26	1.0				5.7	4.9	2.8	4.9	42	9				62	100	9
1/09	1.6	80	14.3	10.4	5.9	5.4	3.6	7.8	56	2	69	42	0.88	73	280	3
1/23	0.8				5.9	4.3	2.3	10.0	74	3				62	120	6
2/07	1.3				5.9	4.7	2.7	11.4	92	6				60	600	0
2/21	0.8				5.9	4.7	2.8	10.6	75	1				63	100	3
VG.	1.5	83	12.9	11.9	5.8	5.5	3.7	6.8	54	10	55	29	0.86	55	169	28
AX.	5.0	130	14.3	14.8	6.1	12.1	10.1	12.4	100	22	69	42	2.00	73	600	130
MIN.	0.3	42	11.1	10.4	5.6	2.8	1.1	0.4	4	0	41	16	0.17	33	22	0

QUABBIN LABORATORY RECORDS 1998
WARE RIVER AND TRIBUTARIES
(108) EAST BR. OF WARE RIVER @ NEW BOSTON

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/05	0.6				6.2	5.4	3.5	12.1	83	0				63	60	5
01/20	0.4				6.0	3.4	1.5	12.4	85	0				58	55	2
02/02	0.5				6.1	4.2	2.2	12.5	86	0				60	45	0
02/17	0.5	33	12.4	11.8	6.0	3.9	2.3	13.1	90	0	49	32	0.12	60	50	1
03/02	0.4				6.0	3.2	1.3	12.0	89	3				52	21	2
03/16	0.4				5.9	2.9	0.9	13.0	91	1				50	34	0
03/30	0.4				6.1	3.3	1.3	10.1	87	9				50	40	6
04/13	0.5				6.0	3.2	1.5	10.6	89	8				52	110	2
04/27	0.6				6.1	4.1	2.5	10.2	86	8				50	78	2
05/11	1.2	70	11.3	9.9	5.9	3.7	2.1	8.9	82	12	44	21	0.37	45	300	80
05/26	0.9				6.3	5.5	3.4	7.7	79	17				53	600	44
06/08	0.8				6.3	5.7	4.1	8.0	79	15				52	130	8
06/22	0.6				5.9	3.9	2.2	6.9	75	20				42	200	110
07/06	1.2				6.2	5.9	4.4	7.0	75	19				48	280	60
07/20	1.5				6.4	7.5	5.7	6.4	74	23				58	300	70
08/03	1.4	80	14.4	13.5	6.5	8.4	6.9	6.4	68	19	56	31	1.00	63	200	110
08/17	1.4				6.4	8.8	7.0	6.0	68	22				62	400	60
08/31	1.5				6.4	10.2	8.4	6.0	65	20				67	450	300
09/14	1.5				6.6	9.6	8.1	6.6	69	18				65	150	0
09/28	1.3				6.4	8.8	7.0	6.4	66	17				72	110	50
10/13	0.9				6.1	5.5	3.7	7.8	74	13				62	170	80
10/26	0.8				6.2	6.0	4.0	9.0	78	9				65	200	9
11/09	1.2	75	12.5	11.6	6.4	7.4	5.5	10.0	74	3	67	41	0.62	70	250	13
11/23	0.8				6.3	6.3	4.3	10.8	80	3				70	120	3
12/07	0.7				6.3	5.7	3.7	10.0	82	7				67	550	9
12/21	0.7				6.4	7.0	5.2	11.6	84	2				70	100	4
AVG	0.9	65	12.7	11.7	6.2	5.8	4.0	9.3	79	10	54	31	0.53	59	192	40
MAX	1.5	80	14.4	13.5	6.6	10.2	8.4	13.1	91	23	67	41	1.00	72	600	300
MIN	0.4	33	11.3	9.9	5.9	2.9	0.9	6.0	65	0	44	21	0.12	42	21	0

UABBIN LABORATORY RECORDS 1998
'ARE RIVER AND TRIBUTARIES
05) WARE RIVER @ BARRE FALLS

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
3/02	0.4				5.9	3.4	1.9	11.6	86	3				63	23	2
3/16	0.5				5.6	2.8	1.2	11.8	85	2				50	50	0
3/30	0.4				6.0	3.3	1.8	9.6	89	12				58	50	0
4/13	0.5				6.1	4.7	3.1	12.8	108	8				68	80	4
4/27	0.6				6.1	4.5	2.6	9.9	84	8				67	106	5
5/11	0.8	80	14.2	11.3	6.1	4.2	2.4	8.0	74	12	51	29	0.43	60	250	80
5/26	1.6				6.3	6.6	4.5	7.8	82	18				63	400	38
6/08	1.5				6.3	6.3	4.4	8.2	79	14				70	200	50
6/22	0.7				5.9	4.5	2.8	6.0	68	22				55	350	60
7/06	1.2				5.9	6.3	4.4	3.7	42	22				62	50	0
7/20	2.7				6.5	11.8	9.9	6.1	69	22				78	170	50
8/03	3.0	140	14.6	18.2	6.4	9.5	7.6	6.2	68	20	73	41	1.63	70	100	40
8/17	3.0				6.4	10.0	8.5	5.6	63	22				72	140	90
8/31	2.8				6.4	11.2	9.5	6.3	67	19				72	600	110
9/14	2.5				6.6	11.0	9.3	7.3	78	19				78	70	30
9/28	2.3				6.5	10.3	8.8	7.6	80	18				80	90	80
0/13	1.0				5.9	5.2	3.3	7.9	75	13				73	280	80
0/26	1.3				6.2	6.0	4.2	9.1	79	9				73	150	22
1/09	1.3	75	16.0	11.9	6.4	6.7	4.7	12.0	89	3	74	48	0.75	82	300	9
1/23	0.8				6.2	5.6	3.8	11.3	84	3				73	80	5
2/07	0.8				6.2	5.6	3.8	10.4	88	8				78	350	0
2/21	0.8				6.2	5.7	3.7	11.6	82	1				88	100	2
VG.	1.4	98	14.9	13.8	6.2	6.6	4.8	8.7	78	13	66	39	0.94	70	181	34
AX.	3.0	140	16.0	18.2	6.6	11.8	9.9	12.8	108	22	74	48	1.63	88	600	110
MIN.	0.4	75	14.2	11.3	5.6	2.8	1.2	3.7	42	1	51	29	0.43	50	23	0

QUABBIN LABORATORY RECORDS 1998
WARE RIVER AND TRIBUTARIES
(104) CANESTO + NATTY BROOKS AT JUNCTION – @ RT. 62

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/05	0.8				6.3	4.1	2.1	12.9	88	0				62	48	16
01/20	0.5				6.2	4.0	2.3	13.6	93	0				58	60	0
02/02	0.5				6.1	3.8	1.7	13.2	90	0				58	30	2
02/17	0.5	33	10.9	12.9	6.1	3.3	1.4	13.0	89	0	50	35	0.20	58	80	0
03/02	0.4				6.0	2.7	0.9	13.2	93	1				50	31	3
03/16	0.3				5.9	2.4	0.5	13.2	90	0				50	50	3
03/30	0.4				6.2	2.7	0.8	11.4	96	8				48	40	2
04/13	0.4				6.1	2.7	0.9	15.0	120	6				52	80	3
04/27	0.5				6.2	3.3	1.8	11.6	93	6				50	120	4
05/11	1.2	95	10.2	9.2	6.1	3.6	2.1	10.2	90	11	50	24	0.78	48	250	70
05/26	1.2				6.5	5.1	3.3	9.1	88	14				50	400	0
06/08	1.2				6.4	4.2	2.3	9.5	88	12				50	400	50
06/22	0.8				6.1	3.7	2.0	8.3	87	18				42	90	40
07/06	1.8				6.4	4.7	2.6	8.7	90	17				48	100	30
07/20	2.5				6.5	6.6	4.8	7.8	85	20				50	120	20
08/03	1.7	95	10.6	10.6	6.6	6.5	5.1	8.3	87	18	52	29	1.60	50	110	30
08/17	2.0				6.6	7.9	6.4	7.7	84	20				52	180	10
08/31	2.3				6.6	8.1	6.6	8.3	83	16				52	600	400
09/14	1.5				6.6	7.5	6.0	8.2	82	16				53	130	0
09/28	1.3				6.5	5.5	3.7	9.8	101	17				58	100	30
10/13	0.8				6.1	3.5	1.6	9.6	89	12				55	350	40
10/26	0.8				6.4	5.1	3.5	10.4	88	8				53	300	9
11/09	0.8	50	8.8	9.0	6.5	5.1	3.4	13.0	94	2	51	34	0.67	52	370	2
11/23	0.5				6.3	3.9	2.1	12.2	91	3				58	90	0
12/07	0.6				6.3	4.1	2.2	11.2	95	8				55	300	3
12/21	0.5				6.4	3.9	2.1	13.2	93	1				57	80	3
AVG	1.0	68	10.1	10.4	6.3	4.5	2.8	10.9	91	9	51	31	0.81	53	173	30
MAX	2.5	95	10.9	12.9	6.6	8.1	6.6	15.0	120	20	52	35	1.60	62	600	400
MIN	0.3	33	8.8	9.0	5.9	2.4	0.5	7.7	82	0	50	24	0.20	42	30	0

UABBIN LABORATORY RECORDS 1998
'ARE RIVER AND TRIBUTARIES
09) LONGMEADOW BROOK @ MOUTH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
1/05	0.7				6.1	8.1	6.1	7.2	49	0				140	55	5
1/20	0.5				6.1	7.3	5.5	8.8	62	1				130	28	5
2/02	0.4				6.2	7.1	5.1	9.3	64	0				142	14	4
2/17	0.4	25	38.2	20.2	6.2	7.0	5.3	10.2	70	0	103	86	0.17	168	75	1
3/02	0.4				6.0	3.4	1.5	11.6	86	3				53	42	0
3/16	0.3				6.2	5.5	4.0	10.8	76	1				113	50	0
3/30	0.4				6.2	7.2	5.3	8.1	72	10				130	60	17
4/13	0.5				6.1	7.3	5.5	7.3	62	8				142	31	1
4/27	0.7				6.2	8.2	6.7	6.8	57	8				150	45	36
5/11	0.8	65	25.7	13.7	6.2	7.2	5.5	6.9	64	12	74	52	0.40	110	250	20
5/26	1.7				6.2	12.8	10.8	2.8	29	17				120	240	50
6/08	1.3				6.1	9.7	7.7	3.4	33	14				130	130	20
6/22	1.2				6.1	10.5	8.5	2.6	29	21				110	300	110
7/06	1.3				6.1	12.6	10.9	1.5	16	20				135	200	90
7/20	4.2				6.2	13.6	11.5	3.6	41	22				92	600	360
8/03	4.3	150	26.2	22.8	6.4	20.8	18.9	1.5	16	19	101	65	3.40	125	200	50
8/17	1.6				6.3	9.8	8.1	4.4	50	22				70	500	60
0/13	1.5				5.9	8.6	6.5	2.0	19	13				127	170	30
0/26	0.9				6.1	6.9	5.0	4.3	36	8				85	200	9
1/09	1.0	38	31.5	18.1	6.2	8.0	6.1	7.3	51	1	97	75	0.50	145	270	5
1/23	0.9				6.2	7.7	5.9	8.0	58	2				140	50	1
2/07	0.8				6.1	7.9	5.9	6.4	54	8				158	400	1
2/21	0.7				6.4	6.7	4.9	9.0	62	0				72	120	2
VG.	1.2	70	30.4	18.7	6.2	8.9	7.0	6.3	50	9	94	70	1.12	121	175	38
AX.	4.3	150	38.2	22.8	6.4	20.8	18.9	11.6	86	22	103	86	3.40	168	600	360
MIN.	0.3	25	25.7	13.7	5.9	3.4	1.5	1.5	16	0	74	52	0.17	53	14	0

QUABBIN LABORATORY RECORDS 1998
WARE RIVER AND TRIBUTARIES
(121) MILL BROOK @ CHARNOCK HILL RD.

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/05	0.7				6.4	10.5	8.6	10.4	71	0				168	17	3
01/20	0.5				6.4	8.3	6.5	11.4	80	1				178	36	3
02/02	0.6				6.4	8.4	6.3	11.2	77	0				182	40	0
02/17	0.5	25	52.9	23.1	6.4	7.5	5.8	12.1	83	0	132	109	0.20	210	60	9
03/02	0.3				6.4	5.7	3.9	11.4	85	3				162	36	27
03/16	0.4				6.4	5.9	4.1	12.1	87	2				128	70	2
03/30	0.4				6.5	6.8	5.1	8.9	80	11				162	100	0
04/13	0.5				6.4	7.0	5.4	9.7	86	10				185	80	5
04/27	1.2				6.4	7.7	6.1	9.7	84	9				190	50	2
05/11	0.6	45	32.4	15.4	6.4	6.9	5.3	9.0	81	11	87	65	0.27	140	600	350
05/26	0.9				6.7	13.1	11.3	7.2	77	19				147	150	0
06/08	1.2				6.6	11.1	9.3	7.6	76	16				180	80	20
06/22	1.2				6.4	10.7	8.8	6.6	73	21				113	300	170
07/06	1.5				6.5	12.3	10.6	6.5	72	21				157	250	20
07/20	2.8				6.7	18.5	16.7	5.8	69	25				170	220	0
08/03	2.3	70	33.0	32.2	7.0	28.1	26.2	6.1	68	21	118	85	1.15	172	180	0
08/17	1.7				6.9	26.0	24.3	6.0	69	23				180	170	20
08/31	5.0				7.0	45.4	43.4	6.2	65	18				200	TNTC	2000
09/14	1.2				7.0	32.2	30.1	6.4	67	18				197	150	10
09/28	2.0				7.1	42.8	41.0	6.2	64	17				200	210	30
10/13	0.9				6.5	11.6	9.7	7.6	72	13				177	300	10
10/26	0.7				6.8	17.8	15.9	8.7	77	10				195	70	1
11/09	0.6	30	45.0	28.2	6.8	14.6	13.0	10.1	77	4	139	105	0.30	210	80	0
11/23	0.7				6.5	10.8	9.3	10.0	78	5				210	80	5
12/07	0.5				6.6	10.8	9.2	9.9	84	8				220	500	0
12/21	0.5				6.5	11.7	9.6	10.8	80	3				220	50	1
AVG.	1.1	43	40.8	24.7	6.6	15.1	13.3	8.8	76	11	119	91	0.48	179	583	103
MAX.	5.0	70	52.9	32.2	7.1	45.4	43.4	12.1	87	25	139	109	1.15	220	TNTC	2000
MIN.	0.3	25	32.4	15.4	6.4	5.7	3.9	5.8	64	0	87	65	0.20	118	17	0

8/31 FECAL COLIFORM RESULT (WITH THE YEARLY AVERAGE INCREASE OF 564%) WAS USED FOR TOTAL COLIFORM RESULT IN PLACE OF TNTC WHEN CALCULATING AVG.

QUABBIN LABORATORY RECORDS 1998
VARE RIVER AND TRIBUTARIES
MOULTON POND – BELOW DAM

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/05	0.7				6.4	11.0	9.3	10.5	78	3				137	20	0
01/20	0.8				6.1	7.0	5.1	10.9	79	2				112	27	0
02/02	0.7				6.1	7.4	5.3	10.1	69	0				135	26	1
02/17	0.9	40	40.4	21.1	6.2	7.6	5.8	11.2	83	3	109	88	0.32	175	39	1
03/02	0.5				6.1	6.0	4.4	11.4	87	4				150	23	0
03/16	0.9				6.2	4.6	2.7	11.6	89	4				88	45	1
03/30	0.5				6.5	6.6	5.1	10.8	91	8				145	36	0
04/13	0.6				6.5	6.8	5.3	10.2	92	11				132	40	0
04/27	0.6				6.5	7.4	5.8	10.0	90	11				123	35	0
05/11	1.0	50	23.4	15.7	6.7	7.5	5.6	9.4	89	13	69	47	0.28	107	400	250
05/26	0.6				6.7	8.6	6.7	8.1	87	19				102	70	0
06/08	0.9				6.6	9.4	7.8	8.2	84	17				107	30	0
06/22	0.6				6.4	7.5	5.5	7.5	85	22				78	30	0
07/06	0.5				6.6	9.9	8.0	7.4	85	23				85	30	0
07/20	0.7				6.6	11.4	9.4	6.8	81	25				92	180	0
08/03	0.9	75	18.9	19.6	6.7	11.8	10.1	7.1	83	24	72	43	0.70	97	50	0
08/17	0.8				6.7	12.2	10.5	7.2	84	24				102	40	0
08/31	1.0				6.7	12.5	10.8	6.0	69	23				108	300	60
09/14	0.9				6.7	13.3	11.8	7.2	78	20				112	200	30
09/28	1.2				6.7	13.9	12.1	7.2	77	19				115	260	30
10/13	0.8				6.8	11.7	10.2	9.0	87	14				108	70	0
10/26	0.9				6.8	11.1	9.6	9.6	87	11				110	70	0
11/09	0.8	40	19.0	18.7	6.8	11.1	9.2	10.6	83	5	79	54	0.25	112	230	2
11/23	0.8				6.7	10.4	8.4	11.0	86	5				112	150	0
12/07	0.8				6.8	10.3	8.5	11.2	90	6				112	200	0
12/21	0.6				6.8	10.6	8.6	12.2	88	2				118	40	0
AVG	0.8	51	25.4	18.8	6.6	9.5	7.8	9.3	84	12	82	58	0.39	114	102	14
MAX	1.2	75	40.4	21.1	6.8	13.9	12.1	12.2	92	25	109	88	0.70	175	400	250
MIN	0.5	40	18.9	15.7	6.1	4.6	2.7	6.0	69	0	69	43	0.25	78	20	0

QUABBIN LABORATORY RECORDS 1998
WARE RIVER AND TRIBUTARIES
(110) LONG + WHITEHALL PONDS @ OUTLET

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	F-	SPCOND	TOTCOLI	FECCOLI
01/05	0.7				6.4	10.6	8.7	9.4	68	2				162	31	2
01/20	0.6				6.4	8.4	6.6	10.8	76	1				143	26	0
02/02	0.6				6.3	8.0	5.9	10.2	72	1				162	33	1
02/17	0.7	23	38.5	18.4	6.3	8.8	7.1	9.4	72	4	103	82	0.27	170	40	0
03/02	0.5				6.3	7.5	6.1	11.0	84	4				163	28	1
03/16	0.6				6.4	5.7	4.2	11.7	87	3				120	43	1
03/30	0.4				6.5	6.0	4.3	11.0	95	9				155	26	1
04/13	0.5				6.5	6.2	4.6	10.6	96	11				170	10	0
04/27	0.5				6.6	6.9	5.3	9.8	90	12				170	23	0
05/11	0.6	30	38.0	16.8	6.6	7.6	5.9	8.1	78	14	88	67	0.25	153	17	2
05/26	0.6				6.8	8.1	6.3	8.1	88	20				140	10	0
06/08	0.7				6.7	8.4	6.8	7.8	82	18				157	7	0
06/22	0.6				6.6	8.6	6.9	7.0	82	24				120	12	3
07/06	0.7				6.6	9.4	7.6	6.6	77	24				143	13	6
07/20	0.8				6.7	10.0	8.3	7.2	88	26				150	25	4
08/03	0.8	38	34.6	16.4	6.7	9.8	8.3	7.2	86	25	89	69	0.62	150	31	4
08/17	0.7				6.8	10.0	8.2	7.2	86	25				150	18	0
08/31	0.6				6.7	10.2	8.4	6.8	80	24				150	12	1
09/14	0.8				6.8	11.1	9.4	7.0	78	21				155	13	0
09/28	0.9				7.0	11.1	9.5	7.8	85	20				153	11	0
10/13	1.0				6.8	10.7	8.9	7.6	75	15				152	210	60
10/26	0.8				6.8	9.6	8.0	8.5	78	12				172	11	2
11/09	0.6	20	39.0	16.0	6.8	9.0	7.1	9.4	77	7	107	84	0.27	178	72	0
11/23	0.5				6.7	8.2	6.7	10.0	78	5				180	30	0
12/07	0.5				6.8	8.0	6.4	11.1	91	7				192	100	0
12/21	0.4				6.6	7.6	5.7	10.8	83	4				200	50	0
AVG	0.6	28	37.5	16.9	6.6	8.7	7.0	8.9	82	13	97	76	0.35	158	35	
MAX	1.0	38	39.0	18.4	7.0	11.1	9.5	11.7	96	26	107	84	0.62	200	210	60
MIN	0.4	20	34.6	16.0	6.3	5.7	4.2	6.6	68	1	88	67	0.25	120	7	0

UABBIN LABORATORY RECORDS 1998
'ARE RIVER AND TRIBUTARIES
19) DEMON POND @ OUTLET

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
1/05	0.4				6.9	11.8	9.8	12.5	90	2				87	14	3
1/20	0.4				6.6	9.7	8.1	11.8	85	2				80	9	0
2/02	0.4				6.4	8.7	6.7	11.1	80	2				77	27	0
2/17	0.4	23	13.5	17.6	6.5	10.1	8.2	11.0	84	4	59	41	0.06	87	25	0
3/02	0.3				6.3	5.1	3.3	11.8	88	3				52	7	0
3/16	0.7				6.5	7.3	5.7	11.8	90	4				67	31	3
3/30	0.5				6.8	8.1	6.3	11.0	93	8				75	16	3
4/13	0.5				6.8	8.4	6.7	11.0	95	9				80	4	0
4/27	0.6				6.8	8.6	6.9	9.7	86	10				80	12	0
5/11	0.6	25	15.2	14.7	6.8	8.7	6.9	8.8	83	13	49	31	0.08	78	60	10
5/26	0.7				6.8	9.6	7.7	7.6	81	19				80	80	0
6/08	0.8				6.7	10.0	8.4	7.3	75	17				80	60	0
6/22	0.6				6.7	9.9	8.3	7.6	89	24				73	70	10
7/06	0.5				6.8	11.1	9.5	7.5	86	23				72	50	0
7/20	0.8				6.8	11.3	9.8	6.9	84	26				73	70	0
8/03	0.8	30	13.2	18.2	6.9	11.2	9.6	6.8	80	24	55	33	0.15	73	110	20
8/17	0.8				6.9	11.7	10.0	7.3	87	25				75	500	30
8/31	1.3				6.9	11.8	10.2	6.8	80	24				78	400	20
0/13	0.6				6.8	12.2	10.5	7.9	76	14				78	150	0
0/26	0.4				6.8	11.7	9.8	8.9	80	11				78	200	1
1/09	0.5	20	11.8	15.6	7.0	12.3	10.5	9.8	79	6	55	36	0.08	80	100	1
1/23	0.5				6.9	11.6	9.7	10.4	81	5				80	50	13
2/07	0.5				7.0	11.7	9.7	11.4	96	8				80	300	70
2/21	0.4				7.0	11.5	9.8	12.2	88	2				80	60	50
VG.	0.6	25	13.4	16.5	6.8	10.2	8.4	9.5	85	12	55	35	0.09	77	100	10
AX.	1.3	30	15.2	18.2	7.0	12.3	10.5	12.5	96	26	59	41	0.15	87	500	70
MIN.	0.3	20	11.8	14.7	6.3	5.1	3.3	6.8	75	2	49	31	0.06	62	4	0

QUABBIN LABORATORY RECORDS 1998
WARE RIVER AND TRIBUTARIES
(102) PARKER BROOK – NEAR MOUTH

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/05	0.7				6.5	4.9	3.1	12.4	90	2				82	110	3
01/20	0.8				6.5	5.5	3.6	12.5	90	2				110	50	0
02/02	0.6				6.4	4.8	3.0	13.0	91	1				102	50	6
02/17	0.5	30	23.9	14.3	6.3	4.5	3.0	13.2	95	2	71	55	0.23	100	60	0
03/02	0.4				6.2	3.9	2.4	12.1	93	4				80	50	0
03/16	0.4				6.2	3.8	2.1	13.1	95	2				82	50	0
03/30	0.5				6.4	4.1	2.3	10.8	91	8				93	60	0
04/13	0.5				6.3	3.9	2.2	11.8	97	7				103	40	0
04/27	0.5				6.4	4.1	2.3	11.4	94	7				102	55	6
05/11	0.8	80	19.4	11.7	6.1	3.4	1.9	10.1	91	11	63	39	0.45	80	300	20
05/26	0.8				6.4	6.3	4.6	9.6	89	12				117	500	10
06/08	1.5				6.2	6.4	4.8	8.9	80	11				110	300	10
06/22	1.2				6.2	5.2	3.7	8.6	89	17				82	90	10
07/06	1.7				6.3	6.4	4.7	8.4	83	15				103	130	60
07/20	2.7				6.4	7.9	6.3	8.2	84	17				120	120	10
08/03	1.8	60	27.0	14.0	6.4	7.5	6.1	8.2	82	16	84	63	0.87	120	10	0
08/17	2.4				6.4	8.2	6.6	8.2	86	18				120	100	30
08/31	2.2				6.4	8.8	7.3	7.7	79	17				120	170	0
09/14	1.7				6.5	8.3	6.7	8.4	83	15				122	300	10
09/28	1.7				6.7	8.6	7.2	9.1	90	15				123	260	11
10/13	1.0				6.4	6.1	4.2	9.8	90	12				118	300	50
10/26	1.2				6.6	7.5	5.8	10.9	92	8				118	500	4
11/09	1.2	30	23.4	12.4	6.7	7.6	5.8	12.2	91	3	80	63	0.50	113	290	5
11/23	0.9				6.5	5.8	4.3	11.8	91	4				107	70	1
12/07	1.0				6.6	6.4	4.6	11.2	95	8				110	300	1
12/21	0.8				6.6	7.0	5.4	12.2	94	4				108	60	17
AVG.	1.1	50	23.4	13.1	6.4	6.0	4.4	10.5	89	9	75	55	0.51	106	166	10
MAX.	2.7	80	27.0	14.3	6.7	8.8	7.3	13.2	97	18	84	63	0.87	123	500	60
MIN.	0.4	30	19.4	11.7	6.1	3.4	1.9	7.7	79	1	63	39	0.23	80	10	0

QUABBIN LABORATORY RECORDS 1998
WARE RIVER AND TRIBUTARIES
N1) NATTY POND BROOK @ HALE RD.

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
11/05	1.2				5.9	7.2	5.2	8.0	55	0				72	120	1
11/20	0.6				5.7	4.7	2.8	7.8	53	0				70	43	2
12/02	0.6				5.7	5.1	3.4	8.3	57	0				70	50	0
12/17	0.5	47	14.1	13.7	5.8	4.8	3.0	9.0	62	0	58	41	0.30	70	90	1
3/02	0.5				5.7	3.3	1.6	10.5	74	1				57	100	0
3/16	0.4				5.6	2.8	1.2	10.4	71	0				57	70	0
3/30	0.4				5.7	3.1	1.5	7.1	61	9				57	100	1
4/13	0.4				5.7	3.7	2.1	5.2	44	8				57	100	5
4/27	0.6				5.8	4.5	2.9	7.6	64	8				53	120	8
5/11	1.5	140	13.8	15.0	5.8	4.7	2.9	5.3	49	12	59	27	1.20	50	600	200
5/26	1.6				6.1	9.0	7.0	4.9	49	16				62	800	50
6/08	1.3				6.0	7.4	5.5	4.8	46	14				57	200	10
6/22	0.8				5.7	5.8	3.8	2.9	32	21				50	100	50
7/06	2.0				5.9	8.3	6.3	2.8	30	19				55	70	10
7/20	3.0				6.0	9.8	8.1	2.2	25	22				60	250	70
8/03	1.6	150	13.5	16.2	6.1	8.4	7.0	3.3	35	19	66	34	1.98	58	30	10
8/17	2.4				6.0	9.2	7.5	2.4	27	21				60	90	0
8/31	1.7				6.0	10.0	8.5	2.9	30	18				60	150	50
9/14	1.0				6.0	8.9	6.9	3.6	37	17				60	170	0
9/28	1.0				6.0	8.1	6.6	5.1	51	16				62	120	12
10/13	0.8				5.7	4.3	2.6	5.2	48	12				53	200	20
10/26	0.6				5.8	5.5	3.9	7.3	62	8				57	300	6
11/09	0.7	70	10.2	9.5	6.0	4.4	2.6	9.5	71	3	52	30	0.68	55	210	0
11/23	0.5				5.7	4.3	2.6	8.9	66	3				60	100	2
12/07	0.5				5.8	4.5	2.9	8.8	73	7				60	600	0
12/21	0.6				5.8	4.5	2.5	9.1	64	1				62	120	0
AVG	1.0	102	12.9	13.6	5.8	6.0	4.3	6.3	51	10	59	33	1.04	59	189	20
MAX	3.0	150	14.1	16.2	6.1	10.0	8.5	10.5	74	22	66	41	1.98	72	800	200
MIN	0.4	47	10.2	9.5	5.6	2.8	1.2	2.2	25	0	52	27	0.30	50	30	0

QUABBIN LABORATORY RECORDS 1998
M.D.C. DRINKING WATER
FIRE HYDRANT

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
05/08					7.1										0	0
05/09					7.4										0	0
05/10					7.7										0	0
11/24	1.8														0	0

ADMINISTRATION BLDG. WATER TANK

05/11															0	0

HANGER BATH TAP

05/08					7.0										0	0
05/09					7.3										0	0
05/10					7.4										0	0

VISITOR CENTER FOUNTAIN

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/27															0	0
02/19	1.2	5	7.2	13.1	7.7	32.3							0.15	122	0	0
03/12															0	0
04/09															0	0
05/08					7.1										0	0
05/09					7.3										0	0
05/10					7.5										0	0
05/20	2.0	5	12.5	19.0	7.6	34.3							0.23	153	0	0
06/23															0	0
07/14															0	0
08/12	1.6	5	7.7	38.7	7.7	29.4							0.17	122	0	0
09/10															0	0
10/15															0	0
11/17	1.8	5	6.3	39.4	8.0	28.8							0.18	115	0	0
11/24	0.9														0	0
12/03															0	0
AVG.	1.5	5	8.4	27.6	7.6	31.2							0.18	128	0	0
MAX.	2.0	5	12.5	39.4	8.0	34.3							0.23	153	0	0
MIN.	0.9	5	6.3	13.1	7.1	28.8							0.15	115	0	0

MAIN OFFICE FOUNTAIN

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/27															0	0
02/19	1.0	5	7.2	13.3	7.7	32.0							0.13	122	0	0
03/12															0	0
04/09															0	0
05/08					7.2										0	0
05/09					7.3										0	0
05/10					7.5										0	0
05/20	2.0	5	12.9	19.8	7.6	33.8							0.25	155	0	0
06/23															0	0
07/14															0	0
08/12	1.6	5	7.8	38.6	7.7	29.3							0.18	122	0	0
09/10															0	0
10/15															0	0
11/17	1.7	5	6.3	39.2	8.0	28.9							0.17	117	0	0
12/03															0	0
AVG.	1.6	5	8.6	27.7	7.6	31.0							0.18	129	0	0
MAX.	2.0	5	12.9	39.2	8.0	33.8							0.25	155	0	0
MIN.	1.0	5	6.3	13.3	7.2	28.9							0.13	117	0	0

)UABBIN LABORATORY RECORDS 1998
I.D.C. DRINKING WATER
LACKSMITH SHOP FOUNTAIN

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
)1/27															0	0
)2/19	1.2	5	8.5	13.5	6.8	50.0							0.15	193	0	0
)3/12															0	0
)4/09															0	0
)5/20	1.0	5	11.5	42.8	6.9	48.1							0.13	187	0	0
)6/23															0	0
)7/14															0	0
)8/12	18.0	15	9.6	18.7	6.9	50.8							1.58	198	0	0
)8/19	4.0												0.42			
)9/10															0	0
)0/15															0	0
)1/17	2.5	5	8.5	34.6	6.9	49.5							0.25	187	0	0
)2/03															0	0
VG.	5.3	8	9.5	27.4	6.9	49.6							0.51	191	0	0
AX.	18.0	15	11.5	42.8	6.9	50.8							1.58	198	0	0
MIN.	1.0	5	8.5	13.5	6.8	48.1							0.13	187	0	0

ANGER STATION TAP

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
)1/27															0	0
)2/19	0.6	5	7.3	11.9	6.7	28.1							0.12	120	0	0
)3/12															0	0
)4/09															0	0
)5/20	0.4	5	6.0	19.4	6.5	27.5							0.10	110	0	0
)6/23															0	0
)7/14															0	0
)8/12	0.3	5	5.9	18.0	6.4	28.0							0.12	110	0	0
)9/10															0	0
)0/15															0	0
)1/17	0.3	5	6.0	33.0	6.4	28.6							0.07	123	0	0
)2/03															0	0
VG.	0.4	5	6.3	20.6	6.5	28.1							0.10	116	0	0
AX.	0.6	5	7.3	33.0	6.7	28.6							0.12	123	0	0
MIN.	0.3	5	5.9	11.9	6.4	27.5							0.07	110	0	0

UABBIN FORESTRY BUILDING

ATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
1/27															0	0
2/19	0.3	5	16.2	21.3	6.9	24.3							0.05	122	0	0
3/12															0	0
4/09															0	0
5/20	0.3	5	11.3	26.0	6.8	27.2							0.04	115	0	0
6/23															0	0
7/14															0	0
8/12	0.3	5	14.9	14.0	6.8	32.3							0.05	142	0	0
9/10															0	0
0/15															2	0
1/17	0.3	5	17.8	42.1	6.8	35.9							0.04	167	1	0
2/03															1	0
VG.	0.3	5	15.1	25.9	6.8	29.9							0.05	137	0	0
AX.	0.3	5	17.8	42.1	6.9	35.9							0.05	167	2	0
MIN.	0.3	5	11.3	14.0	6.8	24.3							0.04	115	0	0

QUABBIN LABORATORY RECORDS 1998
M.D.C. DRINKING WATER
CEMETERY TAP

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/27															0	0
02/19	1.3	5	10.6	18.6	6.9	25.4							0.17	97	0	0
03/12															0	0
04/09															0	0
05/20	1.7	5	9.5	30.4	6.9	26.4							0.17	97	0	0
06/23															0	0
07/14															0	0
08/12	0.7	5	11.7	25.8	6.7	24.9							0.09	93	0	0
09/10															0	0
11/17	60.0	15	8.7	29.8	6.7	26.1							1.50	97	0	0
12/03															0	0
AVG.	15.9	8	10.1	26.2	6.8	25.7							0.48	96	0	0
MAX.	60.0	15	11.7	30.4	6.9	26.4							1.50	97	0	0
MIN.	0.7	5	8.7	18.6	6.7	24.9							0.09	93	0	0

NEW SALEM FORESTRY TAP

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
11/02	0.5	5	73.0	104.5	6.8	30.2							0.06	340	0	0

WARE RIVER OFFICE TAP

DATE	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI
01/20															0	0
02/17	1.4	5	99.1	83.6	7.6	41.1							0.18	480	0	0
03/16															0	0
04/13															0	0
05/26	1.7	5	93.1	158.0	7.6	40.3							0.17	440	0	0
06/22															0	0
07/20															0	0
08/17	2.3	5	98.2	166.0	7.4	38.9							0.20	480	0	0
09/14															0	0
10/13															0	0
11/09	1.2	5	71.0	128.0	7.8	45.7							0.20	380	0	0
12/07															0	0
AVG.	1.7	5	90.4	133.9	7.6	41.5							0.19	445	0	0
MAX.	2.3	5	99.1	166.0	7.8	45.7							0.20	480	0	0
MIN.	1.2	5	71.0	83.6	7.4	38.9							0.17	380	0	0

UABBIN LABORATORY RECORDS 1998
.D.C. DRINKING WATER

ANGER BATH TAP

/28/98 Sample collected and taken to Revet Laboratory, analysis was performed for VOLATILE ORGANIC CONTAMINANTS.
ll compounds were below detection limits.
nalytical Method -- 524.2

ANGER BATH TAP

/4/98 Sample collected and taken to Revet Laboratory, analysis was performed for INORGANICS.
ll compounds, (except those listed below) were below detection limits.
rium 0.036 mg/L
uoride 1.18 mg/L
odium 6.5 mg/L
nalytical Methods -- 200.7, 200.9, 245.1, 4500-F-C, and 9010/335.4

ANGER BATH TAP

2/21/98 Sample collected and taken to Woods Hole Group Enviro. Laboratory, analysis was performed for NITRATE and NITRITE.
esults listed below.
ITRATE 0.38 mg/L
ITRITE <0.05 mg/L
nalytical Method -- 300.0

DATE	SITE	LEAD mg/L	COPPER mg/L
6/4/98	ENG. FOUNTAIN	0.002	0.304
6/4/98	V.C. FOUNTAIN	0.004	0.184
6/4/98	ADMIN. FOUNTAIN	0.004	0.073
6/4/98	KITCHEN TAP - EAST	0.007	0.074
6/4/98	GARAGE FOUNTAIN	0.004	0.080

nalysis was performed by Revet Laboratory
lethods 200.9 and 200.7 were used.

ANGER RAMP STORM DRAIN PIPE OUTFALL

DATE	TURB.	TOTCOLI	FECCOLI	
9/22/98	8.0	TNTC	TNTC	100 ML sample
		TNTC	TNCC	X10 dilution
		10,000	6,000	X100 dilution

NTC = TO NUMEROUS TO COUNT
ample collected during a major storm event -- 2.46" of rain during 5 hours.

QUABBIN LABORATORY RECORDS 1998

GIARDIA RELATED INFORMATION

201 - C.V.A.

DATE	TURBIDITY	TEMP. C	TOTCOLI	FECCOLI
1/12/98	0.3	4	7	1
1/26/98	0.3	2	1	0
2/9/98	0.3	2	1	0
2/23/98	0.3	2	2	2
3/9/98	0.3	4	0	1
3/23/98	0.3	2	2	1
4/6/98	0.3	5	2	0
4/21/98	0.3	7	2	0
5/4/98	0.3	8	4	0
5/18/98	0.3	9	3	0
6/1/98	0.3	11	6	0
6/15/98	0.3	11	3	0
7/13/98	0.3	11	8	0
7/27/98	0.3	13	1	0
8/10/98	0.3	14	130	0
8/24/98	0.3	13	90	0
9/8/98	0.3	14	10	0
9/21/98	0.3	14	180	0
10/5/98	0.3	16	0	0
10/19/98	0.3	15	10	0
11/2/98	0.3	13	2	0
11/16/98	0.3	11	4	0
12/14/98	0.3	8	8	1
12/28/98	0.3	7	4	0

UABBIN LABORATORY RECORDS 1998
:02) WINSOR DAM — RESERVOIR

ATE	DEPTH-M	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI	ELEV	INTAKE M
1/13	0.0															0	0	528.05	18.4
1/13	0.5	0.3	5	6.2	10.5	6.50	4.1	2.6	12.25	98	5.82	27	18	0.03	43				
1/13	3.0					6.51			12.21	97	5.50				43				
1/13	6.0					6.53			12.32	96	5.13				43				
1/13	9.0					6.53			12.28	96	5.11				43				
1/13	12.0					6.53			12.29	96	5.03				43				
1/13	15.0					6.53			12.32	96	4.93				43				
1/13	18.0					6.53			12.32	95	4.72				43				
1/13	21.0					6.53			12.26	95	4.63				43				
1/13	24.0					6.52			12.28	95	4.61				43				
1/13	27.0					6.52			12.26	95	4.56				42				
/13	30.0					6.52			12.23	95	4.53				42				
/13	33.0					6.52			12.24	95	4.52				42				
/13	36.0					6.53			12.21	94	4.49				42				
/13	39.0	0.3	5	6.1	8.6	6.52	4.0	2.5	12.20	94	4.44	27	18	0.03	42				
/13	40.0					6.53			12.20	94	4.40				41				
/13	0.0															3	1	529.09	18.7
/13	0.5	0.3	5	5.0	10.9	6.59	4.0	2.5	10.34	95	11.78	30	18	0.04	44				
/13	3.0					6.58			10.32	95	11.76				43				
/13	6.0					6.59			10.33	94	11.74				43				
/13	9.0					6.61			10.31	94	11.73				43				
/13	12.0					6.63			10.31	94	11.70				43				
/13	15.0					6.64			10.29	94	11.68				43				
/13	18.0					6.65			10.38	95	11.42				43				
/13	21.0					6.66			10.60	93	9.71				43				
/13	24.0					6.68			11.35	94	7.11				42				
/13	27.0					6.64			11.26	93	6.90				42				
/13	30.0					6.57			11.14	91	6.75				42				
/13	33.0					6.55			11.09	90	6.67				42				
/13	36.0					6.52			11.09	90	6.60				42				
/13	39.0					6.47			10.98	89	6.55				42				
/13	42.0					6.43			10.83	88	6.48				42				
/13	43.0					6.40			10.72	87	6.44				42				
/13	44.0	0.3	5	6.2	11.9	6.38	3.9	2.4	10.68	87	6.43	29	18	0.04	42				
/11	0.0															0	0	529.21	18.8
/11	1.0	0.2	5	6.0	10.2	6.68	4.3	2.6	9.67	97	16.08	32	22	0.04	43				
/11	2.0					6.74			9.67	97	15.96				43				
/11	3.0					6.77			9.67	97	15.79				43				
/11	4.0					6.81			9.67	96	15.73				43				
/11	5.0					6.84			9.68	96	15.70				43				
/11	6.0					6.83			9.68	96	15.65				43				
/11	7.0					6.84			9.69	96	15.63				43				
/11	8.0					6.87			9.76	97	15.42				43				
/11	9.0					6.88			9.85	97	15.10				42				
/11	10.0					6.94			9.99	97	14.73				42				
/11	11.0					6.95			10.31	99	13.96				43				
/11	12.0					6.98			10.70	101	12.96				43				
/11	13.0					7.00			10.83	101	12.30				43				
/11	14.0					7.01			10.84	100	11.79				43				
/11	15.0					7.01			10.90	100	11.37				42				
/11	16.0					6.98			10.95	99	11.09				42				
/11	17.0					6.95			10.98	99	10.89				42				
/11	18.0					6.94			10.96	99	10.84				42				
/11	19.0					6.94			11.02	100	10.76				42				
/11	20.0					6.94			11.07	99	10.53				42				
/11	21.0					6.94			11.02	99	10.28				42				
/11	22.0					6.90			10.91	96	10.04				43				
/11	23.0					6.86			10.91	96	9.85				43				
/11	24.0					6.80			10.84	95	9.72				43				
/11	25.0					6.76			10.77	94	9.52				42				
/11	26.0					6.74			10.82	95	9.36				42				

QUABBIN LABORATORY RECORDS 1998
202) WINSOR DAM — RESERVOIR

DATE	DEPTH-M	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI	ELEV	INTAKE
06/11	27.0					6.70			10.78	93	9.08				42				
06/11	28.0					6.65			10.70	93	8.99				42				
06/11	29.0					6.64			10.74	93	8.80				43				
06/11	30.0					6.61			10.59	91	8.58				43				
06/11	31.0					6.53			10.56	90	8.36				43				
06/11	32.0					6.48			10.53	89	8.24				43				
06/11	33.0					6.47			10.52	89	8.05				43				
06/11	34.0					6.45			10.50	89	7.88				43				
06/11	35.0					6.42			10.48	88	7.80				42				
06/11	36.0					6.40			10.42	87	7.74				42				
06/11	37.0					6.39			10.46	87	7.70				42				
06/11	38.0					6.38			10.43	87	7.64				42				
06/11	39.0					6.36			10.40	87	7.58				42				
06/11	40.0					6.34			10.25	85	7.54				43				
06/11	41.0					6.31			10.14	85	7.51				42				
06/11	42.0	0.2	5	6.2	11.3	6.28	4.0	2.3	10.08	84	7.48	32	23	0.04	42				
06/11	43.0					6.27			10.04	84	7.45				42				
07/15	0.0															2	0	530.11	19.
07/15	1.0					6.70			8.19	93	21.92				44				
07/15	2.0					6.70			8.23	92	21.63				44				
07/15	3.0					6.70			8.25	92	21.50				44				
07/15	4.0					6.70			8.39	93	21.17				44				
07/15	5.0	0.2	5	6.0	9.5	6.68	4.0	2.3	8.56	94	20.54	30	18	0.04	43				
07/15	6.0					6.67			8.74	95	20.03				44				
07/15	7.0					6.68			8.82	96	19.78				43				
07/15	8.0					6.69			8.93	96	19.52				44				
07/15	9.0					6.70			8.98	96	19.08				44				
07/15	10.0					6.74			9.42	99	17.82				44				
07/15	11.0					6.74			9.69	99	16.64				43				
07/15	12.0					6.74			9.85	98	15.70				44				
07/15	13.0					6.74			9.98	99	15.29				43				
07/15	14.0					6.71			10.22	99	14.08				43				
07/15	15.0					6.73			10.58	100	12.96				43				
07/15	16.0					6.65			10.74	99	12.11				43				
07/15	17.0					6.61			10.70	99	11.85				43				
07/15	18.0					6.53			10.69	97	10.99				43				
07/15	19.0					6.48			10.53	94	10.65				43				
07/15	20.0					6.45			10.45	93	10.42				43				
07/15	21.0					6.41			10.29	91	10.17				43				
07/15	22.0					6.39			10.19	90	10.05				44				
07/15	23.0					6.35			10.06	89	9.86				44				
07/15	24.0					6.33			10.05	89	9.78				43				
07/15	25.0					6.31			9.95	87	9.67				43				
07/15	26.0					6.30			9.93	87	9.56				43				
07/15	27.0					6.28			9.85	86	9.29				43				
07/15	28.0	0.2	5	6.1	10.2	6.28	4.0	2.6	9.83	85	9.15	31	19	0.03	43				
07/15	29.0					6.25			9.83	85	9.02				43				
07/15	30.0					6.24			9.69	84	8.94				43				
07/15	31.0					6.22			9.61	83	8.78				43				
07/15	32.0					6.22			9.53	81	8.64				43				
07/15	33.0					6.22			9.49	81	8.53				43				
07/15	34.0					6.19			9.50	81	8.48				43				
07/15	35.0					6.17			9.38	80	8.39				43				
07/15	36.0					6.17			9.35	80	8.30				44				
07/15	37.0					6.15			9.23	78	8.15				43				
07/15	38.0					6.15			8.94	75	8.14				43				
07/15	39.0					6.14			8.88	75	8.14				43				
07/15	40.0					6.13			8.75	74	8.14				43				
07/15	41.0					6.13			8.69	73	8.14				43				
07/15	42.0					6.12			8.55	72	8.15				43				
07/15	43.0					6.15			8.42	72	8.40				43				

UABBIN LABORATORY RECORDS 1998
02) WINSOR DAM — RESERVOIR

TE	DEPTH-M	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI	ELEV	INTAKE M
/15	44.0					6.21			8.29	70	8.20				43				
/20	0.0															50	0	528.56	18.6
/20	1.0					6.66			8.20	95	23.41				43				
/20	2.0					6.72			8.13	94	23.42				43				
/20	3.0					6.75			8.13	94	23.41				44				
/20	4.0					6.76			8.13	94	23.40				43				
/20	5.0					6.77			8.11	94	23.39				44				
/20	6.0					6.77			8.10	94	23.39				44				
/20	7.0	0.2	5	6.6	9.9	6.77	4.1	2.4	8.10	94	23.39	28	20	0.04	44				
/20	8.0					6.78			8.08	94	23.37				44				
/20	9.0					6.79			8.08	94	23.37				44				
/20	10.0					6.79			8.07	94	23.36				44				
/20	11.0					6.80			8.06	93	23.33				43				
/20	12.0					6.81			8.07	93	22.79				43				
/20	13.0					6.95			10.15	102	15.84				43				
/20	14.0					6.90			10.32	102	15.12				43				
/20	15.0					6.87			10.32	101	14.57				43				
/20	16.0					6.83			10.56	101	13.34				43				
/20	17.0					6.73			10.38	97	12.46				43				
/20	18.0					6.66			10.31	95	12.12				43				
/20	19.0					6.58			10.00	91	11.71				43				
/20	20.0					6.47			9.86	90	11.45				43				
/20	21.0					6.35			9.34	84	10.95				43				
/20	22.0					6.30			9.33	84	10.83				43				
/20	23.0					6.27			9.33	83	10.64				43				
/20	24.0					6.23			9.33	83	10.42				43				
/20	25.0					6.22			9.26	83	10.29				43				
/20	26.0					6.20			9.26	82	10.22				43				
/20	27.0					6.20			9.14	81	10.04				43				
/20	28.0					6.17			9.14	81	10.00				43				
/20	29.0					6.16			9.07	80	9.85				43				
/20	30.0					6.15			9.05	79	9.68				43				
/20	31.0	0.2	5	7.0	11.2	6.12	4.0	2.5	8.92	78	9.59	29	20	0.04	43				
/20	32.0					6.10			8.88	78	9.42				44				
/20	33.0					6.10			8.92	78	9.32				43				
/20	34.0					6.09			8.80	76	9.05				43				
/20	35.0					6.05			8.50	74	8.79				44				
/20	36.0					6.03			8.37	72	8.60				44				
/20	37.0					6.02			8.35	71	8.50				44				
/20	38.0					6.00			8.28	71	8.32				44				
/20	39.0					5.99			8.05	68	8.24				44				
/20	40.0					5.96			7.81	66	8.16				44				
/20	41.0					5.94			7.47	63	8.09				44				
/20	42.0					5.92			7.42	63	8.07				44				
/20	43.0					5.91			7.35	62	8.05				44				
/20	44.0					5.91			7.31	62	8.03				44				
/16	0.0															0	0	527.28	18.2
/16	1.0					6.66			8.33	94	21.86				45				
/16	2.0					6.72			8.25	93	21.82				44				
/16	3.0					6.76			8.28	93	21.73				45				
/16	4.0					6.78			8.28	93	21.71				44				
/16	5.0					6.79			8.26	93	21.70				44				
/16	6.0	0.2	5	6.7	11.5	6.79	4.0	2.3	8.25	92	21.60	30	17	0.05	44				
/16	7.0					6.77			8.25	92	21.32				44				
/16	8.0					6.72			8.27	92	21.03				44				
/16	9.0					6.70			8.33	92	20.96				44				
/16	10.0					6.69			8.37	93	20.86				44				
/16	11.0					6.64			8.50	93	20.43				44				
/16	12.0					6.59			8.58	94	19.84				44				
/16	13.0					6.62			9.47	99	17.92				44				
/16	14.0					6.61			9.58	99	17.24				43				

QUABBIN LABORATORY RECORDS 1998
202) WINSOR DAM — RESERVOIR

DATE	DEPTH-M	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI	ELEV	INTAKE
09/16	15.0					6.61			9.77	98	15.79				43				
09/16	16.0					6.61			9.97	97	14.40				44				
09/16	17.0					6.58			10.01	95	13.26				43				
09/16	18.0					6.52			9.84	93	12.84				44				
09/16	19.0					6.44			9.60	90	12.41				44				
09/16	20.0					6.33			9.16	85	12.01				43				
09/16	21.0					6.27			9.02	82	11.60				43				
09/16	22.0					6.24			8.87	81	11.32				44				
09/16	23.0					6.22			8.83	80	11.16				43				
09/16	24.0					6.18			8.62	78	10.94				44				
09/16	25.0					6.16			8.58	78	10.86				44				
09/16	26.0					6.14			8.42	75	10.63				43				
09/16	27.0					6.11			8.18	73	10.38				44				
09/16	28.0					6.10			8.23	73	10.25				44				
09/16	29.0					6.09			8.33	74	9.99				44				
09/16	30.0					6.09			8.20	72	9.73				44				
09/16	31.0					6.06			8.01	70	9.69				44				
09/16	32.0	0.2	5	7.0	10.0	6.02	4.3	2.9	7.90	69	9.39	31	19	0.04	44				
09/16	33.0					6.02			7.89	68	9.25				44				
09/16	34.0					6.01			7.70	67	9.11				44				
09/16	35.0					6.01			7.70	67	8.86				43				
09/16	36.0					5.97			7.22	62	8.63				44				
09/16	37.0					5.95			7.16	61	8.52				44				
09/16	38.0					5.95			7.06	60	8.49				44				
09/16	39.0					5.93			6.93	59	8.45				44				
09/16	40.0					5.91			6.66	57	8.37				44				
09/16	41.0					5.90			6.64	57	8.29				44				
09/16	42.0					5.90			6.47	55	8.25				44				
09/16	43.0					5.89			6.34	54	8.25				45				
09/16	44.0					5.87			6.26	53	8.20				45				
09/16	45.0					5.87			6.10	51	8.18				45				
10/21	0.0															3	0	526.27	17
10/21	0.5	0.3	5	5.0	8.4	6.60	4.2	2.7	9.10	91	15.69	26	16	0.03	45				
10/21	3.0					6.60			9.10	91	15.68				45				
10/21	6.0					6.60			9.08	90	15.66				45				
10/21	9.0					6.60			9.07	90	15.66				44				
10/21	12.0					6.60			9.04	90	15.66				44				
10/21	15.0					6.60			9.02	90	15.65				44				
10/21	18.0					6.48			8.60	86	15.38				44				
10/21	21.0					6.10			7.53	70	12.55				45				
10/21	24.0					6.04			7.56	69	11.70				45				
10/21	27.0					5.99			7.39	67	11.11				45				
10/21	30.0					5.99			7.43	66	10.30				45				
10/21	33.0					5.95			7.19	63	9.83				44				
10/21	36.0					5.92			6.55	57	9.08				44				
10/21	39.0					5.90			6.05	52	8.83				45				
10/21	42.0					5.87			5.58	48	8.68				45				
10/21	43.0	0.3	5	5.5	11.0	5.87	4.4	2.8	5.53	47	8.66	28	17	0.06	45				
10/21	44.0					5.86			5.41	46	8.56				45				
	AVG.	0.2	5	6.1	10.4	6.45	4.1	2.5	9.40	86	11.84	29	19	0.04	43	8	0		
	MAX.	0.3	5	7.0	11.9	7.01	4.4	2.9	12.32	102	23.42	32	23	0.06	45	50	1		
	MIN.	0.2	5	5.0	8.4	5.86	3.9	2.3	5.41	46	4.40	26	16	0.03	41	0	0		

JABBIN LABORATORY RECORDS 1998
06) SHAFT #12 — RESERVOIR

TE	DEPTH-M	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	F6	SPCOND	TOTCOLI	FECCOLI	ELEV	INTAKE M
/13	0.0															1	0	528.05	24.1
/13	0.5	0.3	5	6.2	10.2	6.46	4.1	2.7	12.26	97	5.50	28	17	0.04	43				
/13	3.0					6.52			12.43	98	5.27				43				
/13	6.0					6.57			12.40	97	5.00				44				
/13	9.0					6.58			12.36	97	4.94				43				
/13	12.0					6.58			12.33	96	4.92				43				
/13	15.0					6.58			12.40	97	4.89				42				
/13	18.0					6.59			12.33	96	4.83				43				
/13	21.0					6.60			12.32	96	4.81				42				
/13	24.0					6.60			12.29	96	4.81				42				
/13	27.0	0.3	5	6.2	8.3	6.60	4.2	2.8	12.30	96	4.79	29	18	0.05	42				
/13	28.0					6.60			12.32	96	4.77				42				
/13	0.0															1	0	529.09	24.4
/13	0.5	0.3	5	5.2	10.8	6.51	4.0	2.5	10.86	96	10.15	29	17	0.04	45				
/13	3.0					6.53			10.84	96	10.14				43				
/13	6.0					6.55			10.89	95	9.64				43				
/13	9.0					6.56			10.92	95	9.33				43				
/13	12.0					6.56			11.01	94	8.73				43				
/13	15.0					6.55			11.09	94	8.17				43				
/13	18.0					6.54			11.10	94	7.82				42				
/13	21.0					6.53			11.17	93	7.50				42				
/13	24.0					6.52			11.17	93	7.36				42				
/13	27.0	0.3	5	6.0	10.8	6.51	3.9	2.4	11.14	92	7.20	29	18	0.03	42				
/13	28.0					6.50			11.13	92	7.14				42				
/11	0.0															2	0	529.21	24.4
/11	1.0	0.2	5	6.5	10.2	6.81	4.3	2.7	9.20	95	17.04	32	22	0.03	44				
/11	2.0					6.80			9.25	95	16.98				44				
/11	3.0					6.79			9.26	95	16.96				44				
/11	4.0					6.79			9.28	96	16.92				43				
/11	5.0					6.77			9.27	95	16.89				43				
/11	6.0					6.74			9.30	96	16.81				43				
/11	7.0					6.72			9.31	96	16.80				43				
/11	8.0					6.70			9.35	95	16.53				43				
/11	9.0					6.69			9.38	96	16.29				43				
/11	10.0					6.67			9.38	94	16.14				43				
/11	11.0					6.63			9.36	94	15.90				42				
/11	12.0					6.67			10.89	101	11.80				43				
/11	13.0					6.64			10.83	98	11.13				42				
/11	14.0					6.63			10.89	98	10.76				42				
/11	15.0					6.59			10.87	97	10.52				42				
/11	16.0					6.56			10.82	97	10.34				43				
/11	17.0					6.52			10.81	95	10.20				43				
/11	18.0					6.49			10.71	95	10.05				42				
/11	19.0					6.47			10.69	94	9.89				42				
/11	20.0					6.44			10.61	94	9.81				42				
/11	21.0					6.40			10.55	92	9.58				43				
/11	22.0					6.38			10.47	92	9.40				42				
/11	23.0					6.37			10.43	91	9.28				43				
/11	24.0					6.34			10.38	90	9.14				43				
/11	25.0					6.30			10.31	89	9.08				42				
/11	26.0					6.28			10.30	89	9.02				43				
/11	27.0	0.2	5	6.5	9.2	6.24	3.9	2.2	10.19	88	8.86	33	22	0.03	42				

QUABBIN LABORATORY RECORDS 1998
(206) SHAFT #12 — RESERVOIR

DATE	DEPTH-M	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI	ELEV	INTAKE
07/15	0.0															1	0	530.11	24.
07/15	1.0					6.70			7.99	93	23.37				44				
07/15	2.0					6.70			8.00	92	23.21				44				
07/15	3.0					6.70			8.00	92	23.04				44				
07/15	4.0	0.2	5	6.5	10.0	6.71	4.1	2.6	8.02	92	22.93	32	18	0.03	43				
07/15	5.0					6.71			8.01	92	22.77				43				
07/15	6.0					6.72			8.03	92	22.68				43				
07/15	7.0					6.73			8.03	92	22.63				43				
07/15	8.0					6.73			8.03	92	22.61				43				
07/15	9.0					6.90			9.45	98	17.28				43				
07/15	10.0					6.90			9.56	98	16.34				43				
07/15	11.0					6.90			9.70	97	15.52				43				
07/15	12.0					6.87			9.76	96	15.10				43				
07/15	13.0					6.82			9.89	95	14.02				44				
07/15	14.0					6.80			9.90	94	13.63				44				
07/15	15.0					6.76			9.91	94	13.10				43				
07/15	16.0					6.71			10.00	93	12.40				43				
07/15	17.0					6.65			9.85	90	11.74				43				
07/15	18.0					6.57			9.82	90	11.42				44				
07/15	19.0					6.50			9.57	87	10.95				44				
07/15	20.0	0.3	5	6.2	10.2	6.40	4.3	2.6	9.38	84	10.73	31	19	0.03	43				
07/15	21.0					6.38			9.34	83	10.58				43				
07/15	22.0					6.35			9.24	83	10.46				43				
07/15	23.0					6.28			9.15	81	10.25				43				
07/15	24.0					6.24			9.05	80	10.14				44				
07/15	25.0					6.23			8.87	78	9.98				44				
07/15	26.0					6.18			8.66	76	9.74				44				
07/15	27.0					6.13			8.37	73	9.59				44				
07/15	28.0					6.10			8.17	71	9.47				44				
08/20	0.0															1	0	528.56	24.
08/20	1.0					6.62			8.27	94	22.58				44				
08/20	2.0					6.65			8.24	94	22.57				44				
08/20	3.0					6.68			8.23	94	22.53				44				
08/20	4.0					6.70			8.21	94	22.53				44				
08/20	5.0					6.72			8.18	93	22.57				44				
08/20	6.0					6.73			8.17	93	22.57				44				
08/20	7.0	0.3	5	6.9	9.0	6.73	4.1	2.7	8.15	93	22.58	29	20	0.04	44				
08/20	8.0					6.73			8.15	93	22.58				44				
08/20	9.0					6.75			8.15	93	22.55				44				
08/20	10.0					6.75			8.14	93	22.55				44				
08/20	11.0					6.72			8.14	93	22.53				43				
08/20	12.0					6.72			8.46	95	21.75				43				
08/20	13.0					6.75			9.62	100	17.26				44				
08/20	14.0					6.70			9.97	98	15.00				44				
08/20	15.0					6.62			10.00	97	14.10				44				
08/20	16.0					6.56			9.92	95	13.45				43				
08/20	17.0					6.52			9.91	94	12.91				43				
08/20	18.0					6.48			9.77	91	12.31				43				
08/20	19.0					6.39			9.61	89	11.80				43				
08/20	20.0					6.26			9.04	83	11.28				43				
08/20	21.0					6.21			8.95	81	11.16				44				
08/20	22.0	0.3	5	7.0	12.0	6.19	4.0	2.7	8.80	80	11.01	28	20	0.05	43				

ABBIN LABORATORY RECORDS 1998
6) SHAFT #12 — RESERVOIR

TE	DEPTH-M	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI	ELEV	INTAKE M
20	23.0					6.14			8.52	76	10.71				43				
20	24.0					6.12			8.42	75	10.63				44				
20	25.0					6.09			8.32	74	10.56				44				
20	26.0					6.08			8.25	74	10.45				44				
20	27.0					6.04			8.00	72	10.35				44				
16	0.0															0	0	527.28	23.9
16	1.0					6.55			8.24	93	21.82				45				
16	2.0					6.57			8.21	93	21.82				45				
16	3.0					6.61			8.22	93	21.78				45				
16	4.0					6.63			8.21	92	21.74				45				
16	5.0					6.66			8.19	92	21.69				44				
16	6.0	0.2	5	6.4	8.0	6.66	4.2	2.8	8.18	92	21.68	31	19	0.03	44				
16	7.0					6.67			8.18	92	21.67				44				
16	8.0					6.68			8.16	91	21.63				44				
16	9.0					6.70			8.15	91	21.60				44				
16	10.0					6.70			8.15	91	21.59				44				
16	11.0					6.70			8.14	91	21.57				44				
16	12.0					6.71			8.13	91	21.54				44				
16	13.0					6.50			8.83	89	16.10				44				
16	14.0					6.30			8.66	85	14.78				44				
16	15.0					6.21			8.49	82	14.10				44				
16	16.0					6.18			8.49	82	13.79				44				
16	17.0					6.18			8.62	82	13.49				44				
16	18.0	0.3	5	6.9	9.0	6.18	4.2	2.8	8.62	81	12.90	30	17	0.03	44				
16	19.0					6.14			8.41	79	12.36				44				
16	20.0					6.11			8.36	77	12.23				43				
16	21.0					6.08			8.18	76	11.77				43				
16	22.0					6.04			7.93	72	11.55				44				
16	23.0					6.00			7.46	67	10.99				44				
21	0.0															2	0	526.27	23.5
21	0.5	0.3	5	5.3	10.8	6.59	4.2	2.7	9.20	91	15.25	26	14	0.04	45				
21	3.0					6.57			9.20	91	15.25				45				
21	6.0					6.56			9.17	90	15.25				44				
21	9.0					6.57			9.16	90	15.25				44				
21	12.0					6.58			9.12	91	15.26				44				
21	15.0					6.57			9.10	91	15.26				44				
21	18.0					6.58			9.10	91	15.26				44				
21	21.0					6.57			9.08	89	15.25				44				
21	24.0					5.98			6.84	64	12.34				44				
21	25.0	0.3	5	5.5	13.6	5.90	4.0	2.4	6.56	60	11.72	26	15	0.04	45				
21	26.0					5.89			6.41	59	11.48				45				
	AVG.	0.3	5	6.2	10.2	6.52	4.1	2.6	9.42	90	13.99	30	18	0.04	43	1	0		
	MAX.	0.3	5	7.0	13.6	6.90	4.3	2.8	12.43	101	23.37	33	22	0.05	45	2	0		
	MIN.	0.2	5	5.2	8.0	5.89	3.9	2.2	6.41	59	4.77	26	14	0.03	42	0	0		

QUABBIN LABORATORY RECORDS 1998
DEN HILL — RESERVOIR

DATE	DEPTH-M	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI	ELEV	INTAKE M
04/13	0.0															0	0	528.05	
04/13	0.5	0.4	13	7.4	8.8	6.49	4.1	2.6	11.54	100	9.00	34	19	0.06	48				
04/13	3.0					6.47			11.78	99	7.87				47				
04/13	6.0					6.54			11.66	96	7.15				48				
04/13	9.0					6.46			11.51	95	6.87				47				
04/13	12.0					6.44			11.50	94	6.74				47				
04/13	15.0					6.42			11.44	93	6.69				47				
04/13	18.0	0.3	13	7.5	9.0	6.44	3.7	2.2	11.51	94	6.55	33	20	0.07	47				
04/13	19.0					6.44			11.43	93	6.50				47				
05/13	0.0															7	0	529.09	
05/13	0.5	0.3	10	6.7	11.3	6.43	4.5	2.8	9.83	93	13.12	33	22	0.04	46				
05/13	3.0					6.50			9.79	92	12.90				46				
05/13	6.0					6.52			9.79	91	12.57				45				
05/13	9.0					6.50			9.77	90	12.21				45				
05/13	12.0					6.49			10.09	88	9.50				45				
05/13	15.0					6.42			10.02	87	8.77				44				
05/13	16.0	0.3	10	7.0	11.8	6.34	4.0	2.4	9.98	85	8.71	31	21	0.05	45				
05/13	17.0					6.31			9.96	85	8.68				45				
06/11	0.0															1	0	529.21	
06/11	1.0	0.4	7	6.9	8.2	6.69	4.0	2.3	8.78	93	18.51	35	21	0.05	45				
06/11	2.0					6.68			8.90	93	17.89				44				
06/11	3.0					6.66			8.95	93	17.69				44				
06/11	4.0					6.67			9.02	94	17.39				45				
06/11	5.0					6.66			9.07	93	16.99				44				
06/11	6.0					6.62			9.07	93	16.87				44				
06/11	7.0					6.57			9.10	93	16.68				44				
06/11	8.0					6.51			9.10	93	16.33				44				
06/11	9.0					6.46			9.35	93	15.49				44				
06/11	10.0					6.38			9.34	92	15.20				44				
06/11	11.0					6.31			9.47	91	13.79				44				
06/11	12.0					6.23			9.24	86	12.39				44				
06/11	13.0					6.23			9.16	84	11.73				44				
06/11	14.0					6.20			9.16	83	11.23				45				
06/11	15.0					6.10			8.90	80	10.85				44				
06/11	16.0					6.08			8.79	79	10.32				45				
06/11	17.0					6.05			8.68	77	10.10				45				
06/11	18.0					6.04			8.64	76	9.90				44				
06/11	19.0	0.3	8	7.5	10.5	6.04	3.9	2.3	8.39	73	9.74	35	24	0.06	45				
07/15	0.0															0	0	530.11	
07/15	1.0					6.61			7.74	91	24.75				44				
07/15	2.0					6.64			7.73	91	24.37				44				
07/15	3.0					6.66			7.81	91	23.71				44				
07/15	4.0	0.3	7	6.2	11.5	6.66	3.9	2.4	7.85	90	23.20	33	17	0.05	44				
07/15	5.0					6.66			7.91	91	22.82				44				
07/15	6.0					6.65			7.85	89	22.58				44				
07/15	7.0					6.56			7.91	88	21.02				44				
07/15	8.0					6.50			7.97	88	20.86				44				
07/15	9.0					6.41			7.74	83	18.98				44				
07/15	10.0					6.33			7.46	78	18.13				44				
07/15	11.0					6.25			7.15	74	17.21				44				
07/15	12.0					6.18			7.00	70	16.24				44				
07/15	13.0					6.13			6.99	69	15.00				44				
07/15	14.0					6.09			6.79	66	13.88				45				
07/15	15.0	0.4	7	6.5	11.6	6.05	3.9	2.4	7.08	66	12.34	33	20	0.05	45				
07/15	16.0					6.01			6.73	62	11.60				46				
07/15	17.0					5.98			6.60	60	10.98				46				

UABBIN LABORATORY RECORDS 1998
EN HILL — RESERVOIR

TE	DEPTH-M	TURB	COLOR	CHLO	HARD	pH	STDALK	EPAALK	DOPPM	DOSAT	TEMPC	RESTOT	RESFIX	Fe	SPCOND	TOTCOLI	FECCOLI	ELEV	INTAKE M
/15	18.0					5.97			6.18	55	10.53				46				
/15	19.0					5.97			6.26	56	10.30				46				
/15	20.0					5.94			5.92	53	10.04				46				
/20	0.0															0	0	528.56	
/20	1.0					6.52			7.78	91	23.79				45				
/20	2.0					6.52			7.77	91	23.77				45				
/20	3.0					6.53			7.73	90	23.74				45				
/20	4.0					6.51			7.72	90	23.68				44				
/20	5.0					6.54			7.71	89	23.67				44				
/20	6.0	0.3	7	7.0	9.0	6.54	4.3	2.9	7.70	89	23.64	30	20	0.07	44				
/20	7.0					6.53			7.70	89	23.61				44				
/20	8.0					6.53			7.70	89	23.59				44				
/20	9.0					6.53			7.68	89	23.58				44				
/20	10.0					6.51			7.54	87	23.45				44				
/20	11.0					6.21			6.45	68	18.05				45				
/20	12.0					6.07			6.45	66	17.16				45				
/20	13.0					6.01			5.61	56	15.76				45				
/20	14.0					5.97			5.87	57	14.35				45				
/20	15.0					5.91			5.20	50	13.46				46				
/20	16.0					5.89			4.45	41	12.09				47				
/20	17.0	0.5	10	7.2	9.5	5.89	4.5	3.1	4.70	43	11.39	30	22	0.13	46				
/20	18.0					5.87			4.47	40	10.75				46				
/20	19.0					5.85			4.40	39	10.54				46				
/16	0.0															0	0	527.28	
/16	1.0					6.50			8.04	90	21.72				45				
/16	2.0					6.52			8.02	90	21.68				45				
/16	3.0					6.54			8.00	90	21.70				45				
/16	4.0					6.56			7.97	89	21.68				45				
/16	5.0					6.57			7.95	89	21.68				45				
/16	6.0					6.55			7.93	89	21.50				45				
/16	7.0	0.3	8	7.2	7.7	6.53	4.4	3.0	7.71	86	21.45	32	18	0.06	45				
/16	8.0					6.45			7.66	85	21.15				45				
/16	9.0					6.43			7.63	85	21.13				44				
/16	10.0					6.40			7.51	83	21.03				44				
/16	11.0					6.37			7.44	83	20.97				44				
/16	12.0					6.32			7.17	80	20.82				44				
/16	13.0					6.21			6.80	75	20.40				45				
/16	14.0					6.05			5.60	60	19.13				45				
/16	15.0					5.93			4.68	48	16.61				45				
/16	16.0					5.88			3.79	36	13.15				47				
/16	17.0	2.3	20	7.3	9.0	5.87	5.4	3.7	3.22	29	11.45	36	21	0.58	47				
/16	18.0					5.88			2.58	23	10.99				49				
/16	19.0					5.88			2.38	22	10.80				49				
21	0.0															1	0	526.27	
21	0.5	0.5	7	5.7	9.6	6.52	4.3	2.8	9.01	89	14.82	27	15	0.13	46				
21	3.0					6.50			8.98	88	14.84				46				
21	6.0					6.50			8.97	88	14.85				45				
21	9.0					6.50			8.95	88	14.85				44				
21	12.0					6.50			8.95	88	14.85				44				
21	15.0					6.50			8.92	88	14.80				45				
21	17.0	0.5	7	5.9	9.0	6.50	4.2	2.7	8.87	87	14.80	28	16	0.12	45				
21	18.0					6.15			6.19	60	13.85				46				
	AVG.	0.5	10	6.9	9.8	6.34	4.2	2.7	7.95	79	15.82	32	20	0.11	45	1	0		
	MAX	2.3	20	7.5	11.8	6.69	5.4	3.7	11.78	100	24.75	36	24	0.58	49	7	0		
	MIN	0.3	7	5.7	7.7	5.85	3.7	2.2	2.38	22	8.50	27	15	0.04	44	0	0		

APPENDIX B

MISCELLANEOUS

Precipitation Tables:

Administration Bldg. Sampler
Belchertown, MA

Coldbrook/Intake Works
Barre, MA

Quabbin Civil Engineering Section staff compile precipitation data from six weather stations established throughout the Quabbin Reservoir and Ware River watershed. Precipitation stations at Coldbrook (Barre, MA) and the Administration Building (Belchertown, MA) are measured once daily Monday thru Friday. Precipitation that collects over the weekend or during non-working days is measured the morning of the next business day.

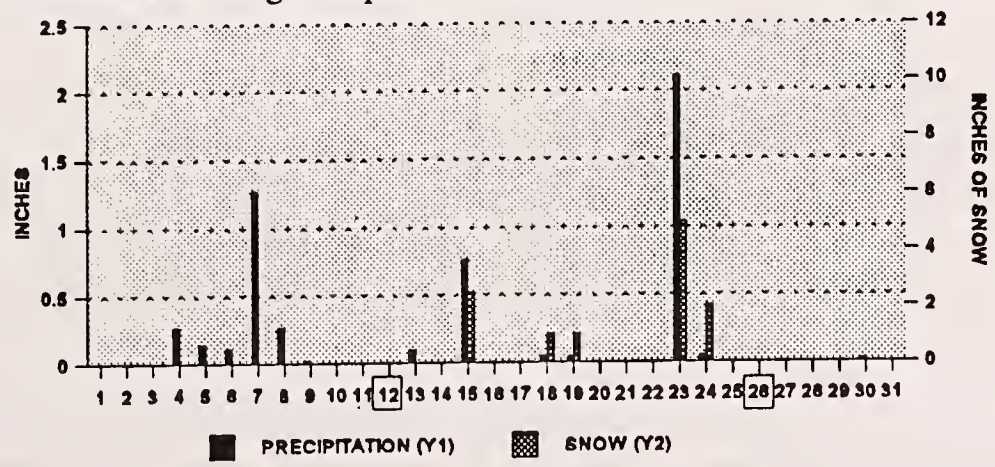
Legend

00 Day of laboratory sampling run.

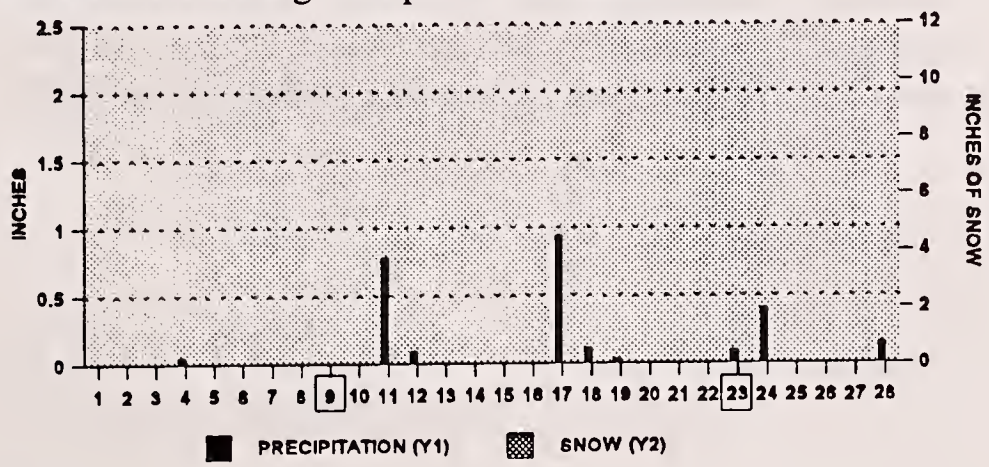
24 hr Snow, Sleet or Freezing Rain

24 hr Rainfall

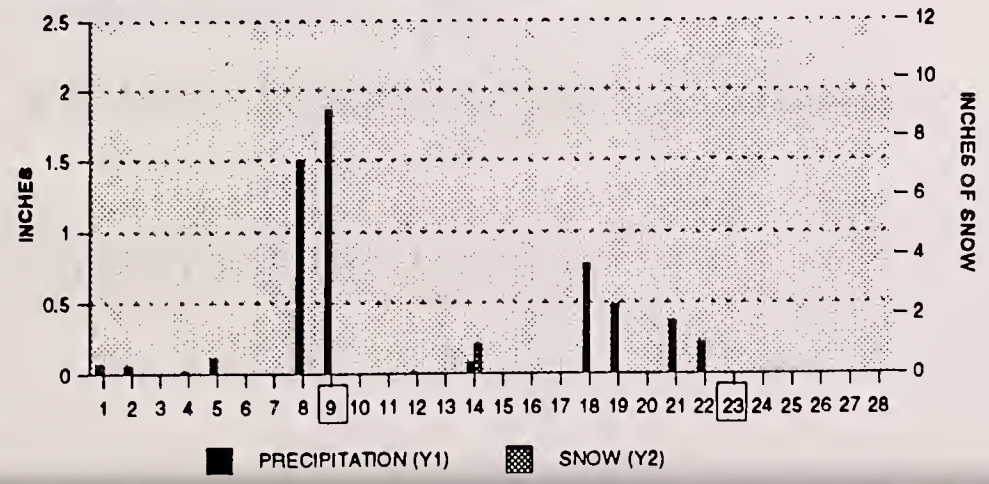
January 1998 - Precipitation Events
Administration Bldg. Sampler - Belchertown



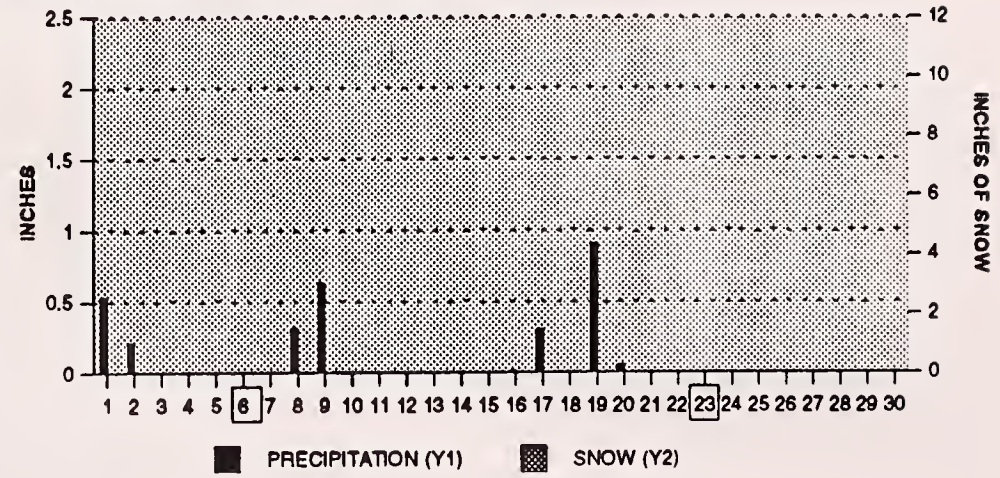
February 1998 - Precipitation Events
Administration Bldg. Sampler - Belchertown



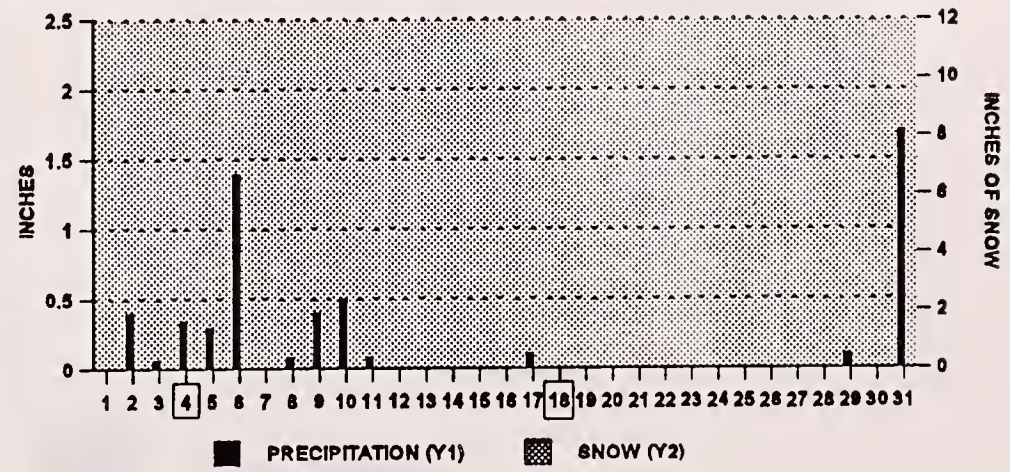
March 1998 - Precipitation Events
Administration Bldg. Sampler - Belchertown



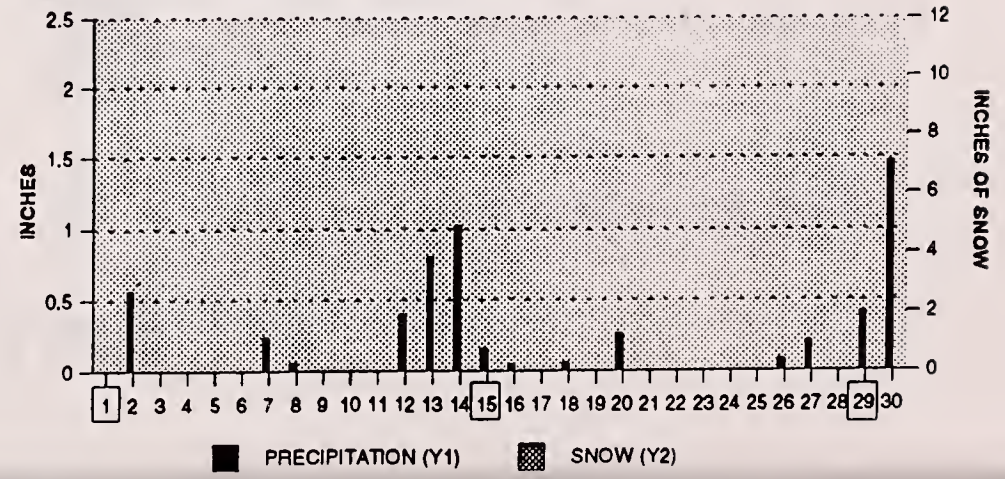
April 1998 - Precipitation Events
Administration Bldg. Sampler - Belchertown



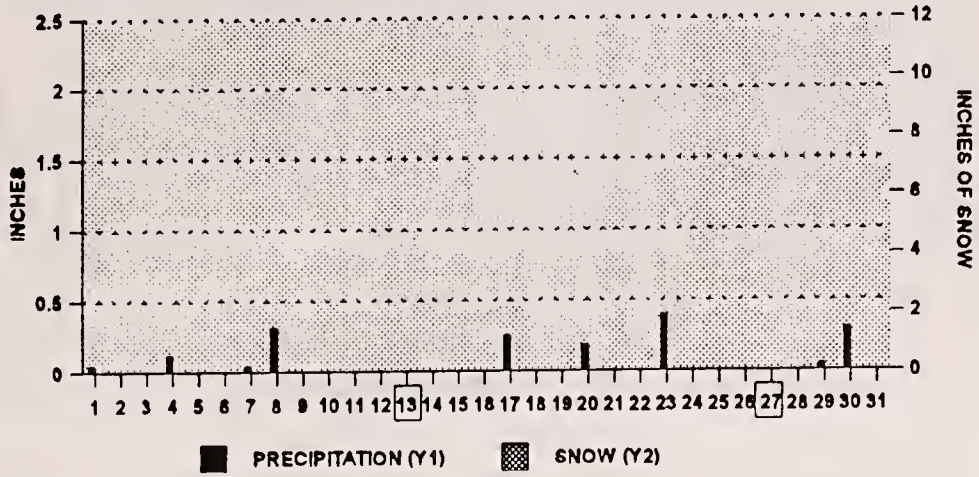
May 1998 - Precipitation Events
Administration Bldg. Sampler - Belchertown



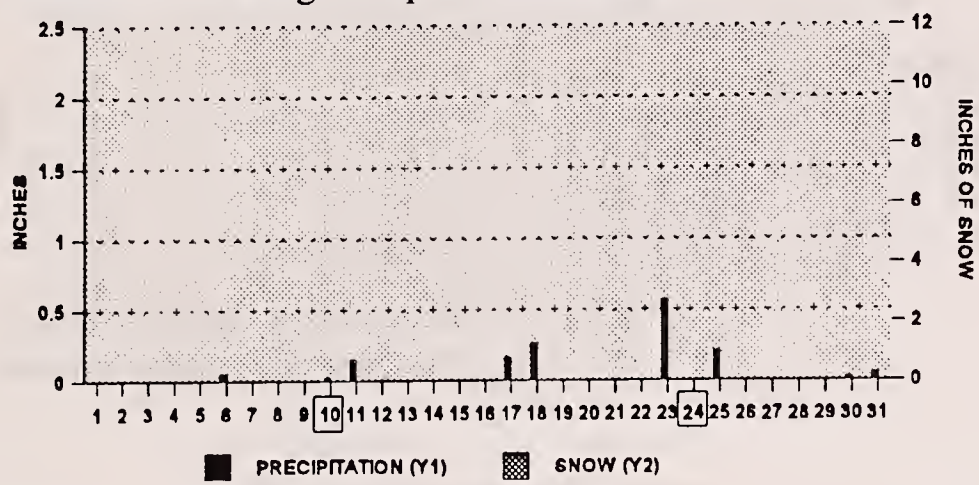
June 1998 - Precipitation Events
Administration Bldg. Sampler - Belchertown



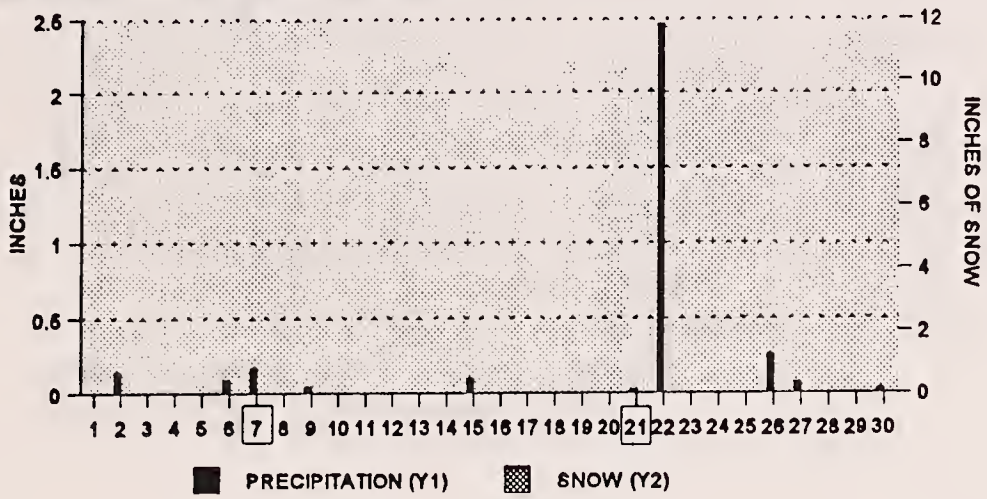
July 1998 - Precipitation Events
Administration Bldg. Sampler - Belchertown



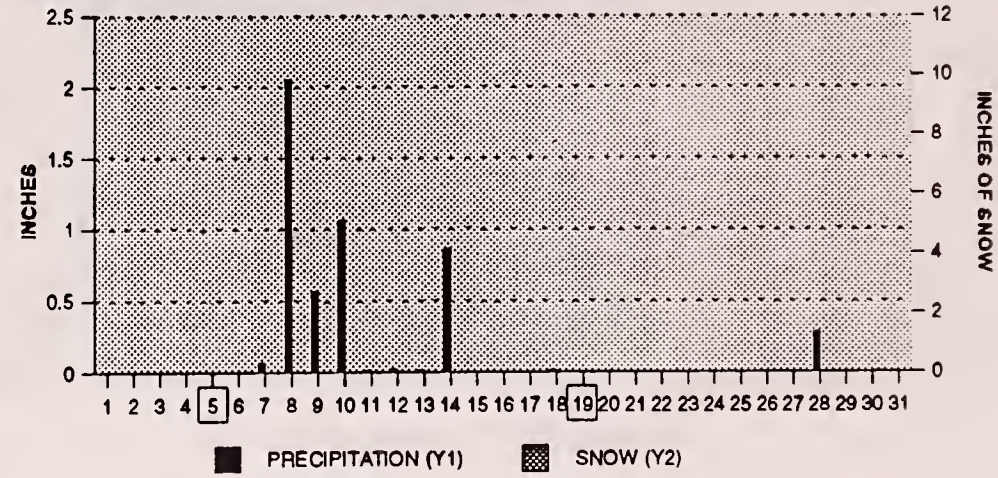
August 1998 - Precipitation Events
Administration Bldg. Sampler - Belchertown



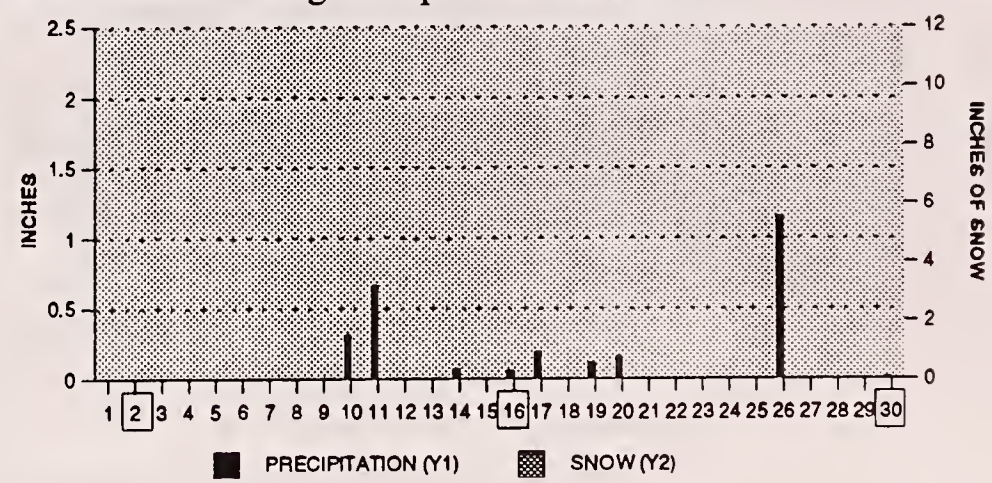
September 1998 - Precipitation Events
Administration Bldg. Sampler



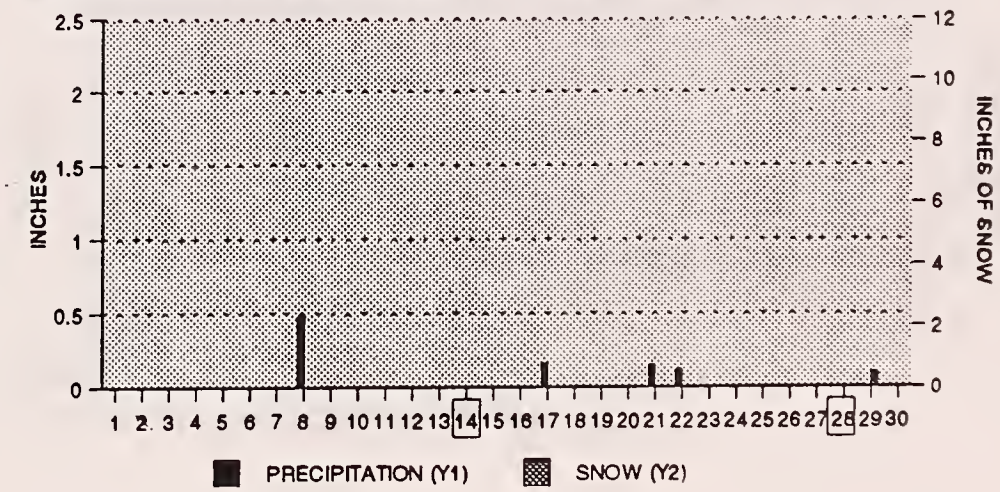
October 1998 - Precipitation Events
Administration Bldg. Sampler - Belchertown



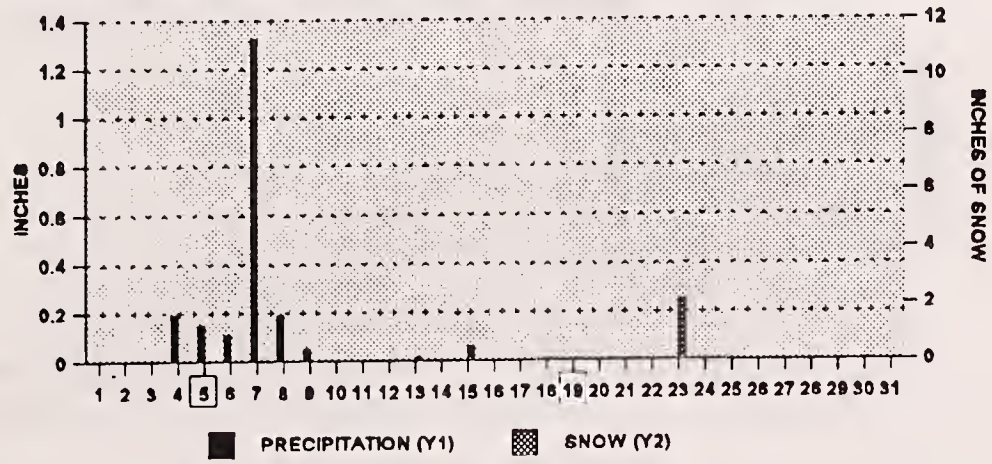
November 1998 - Precipitation Events
Administration Bldg. Sampler - Belchertown



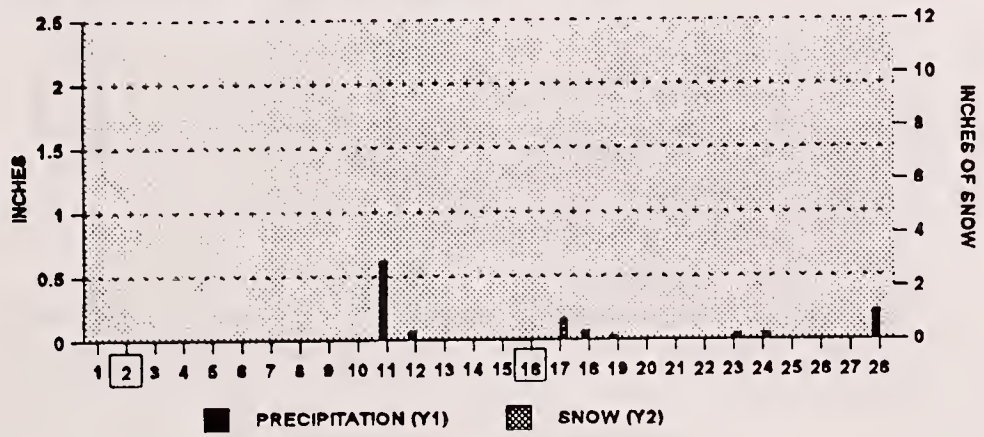
December 1998 - Precipitation Events
Administration Bldg. Sampler - Belchertown



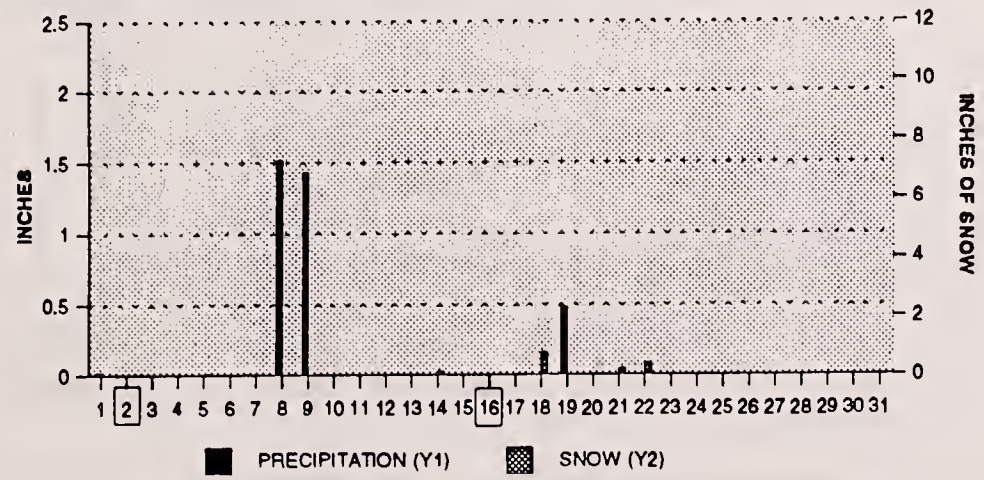
January 1998 - Precipitation Events
Coldbrook/Intake Works Sampler - Barre



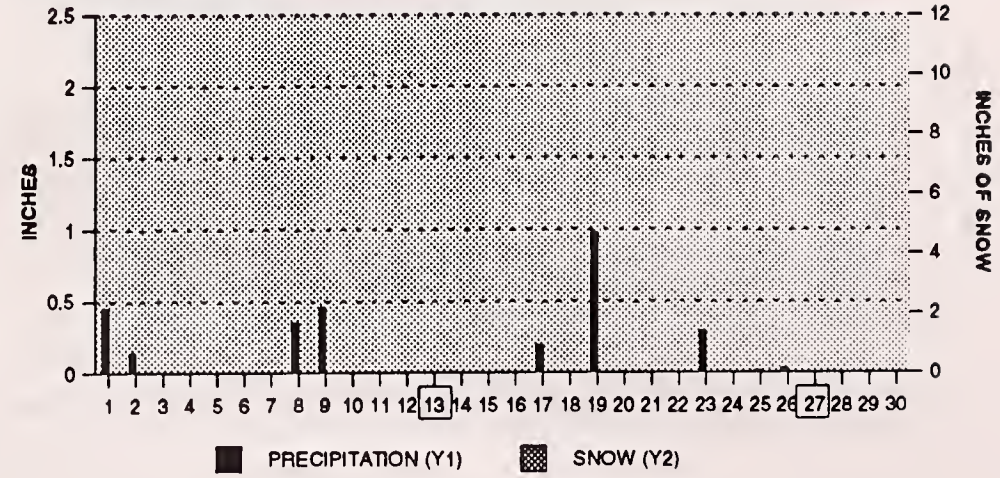
February 1998 - Precipitation Events
Coldbrook/Intake Works Sampler - Barre



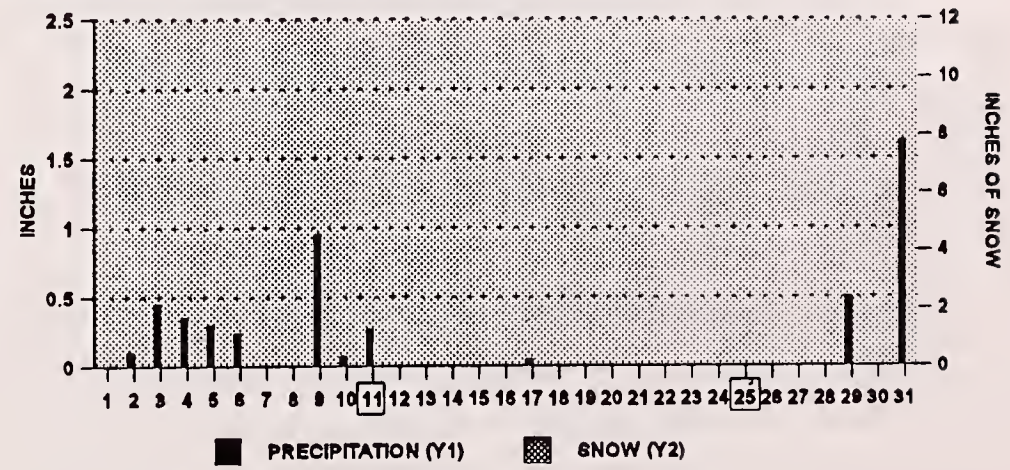
March 1998 - Precipitation Events
Coldbrook/Intake Works Sampler - Barre



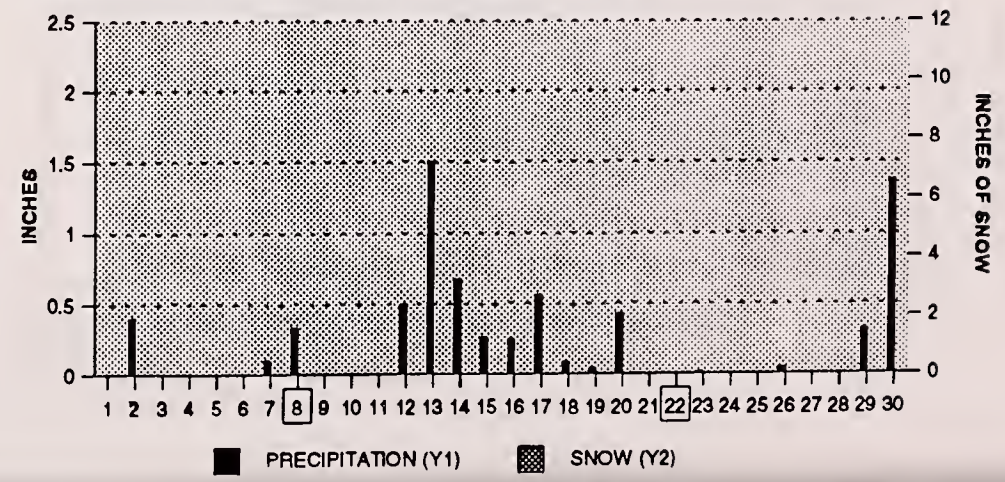
April 1998 - Precipitation Events
Coldbrook/Intake Works - Barre



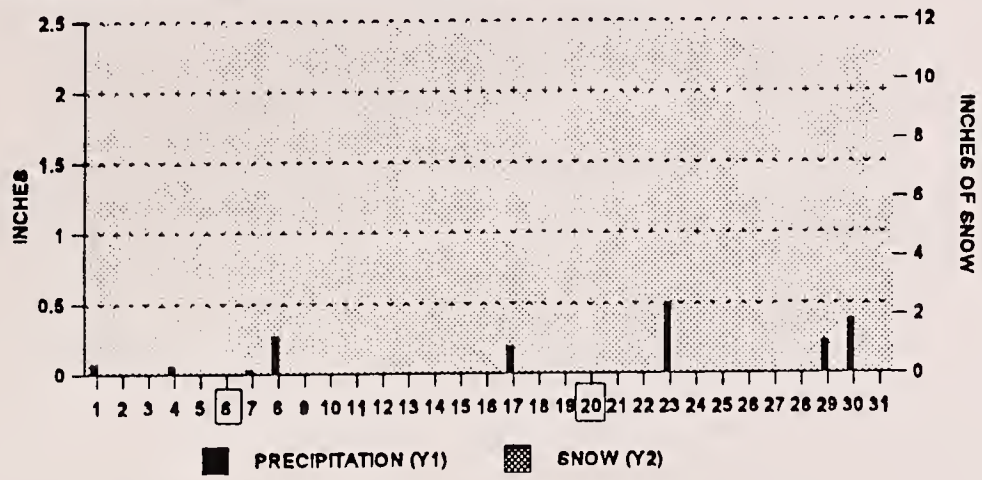
May 1998 - Precipitation Events
Coldbrook/Intake Works Sampler - Barre



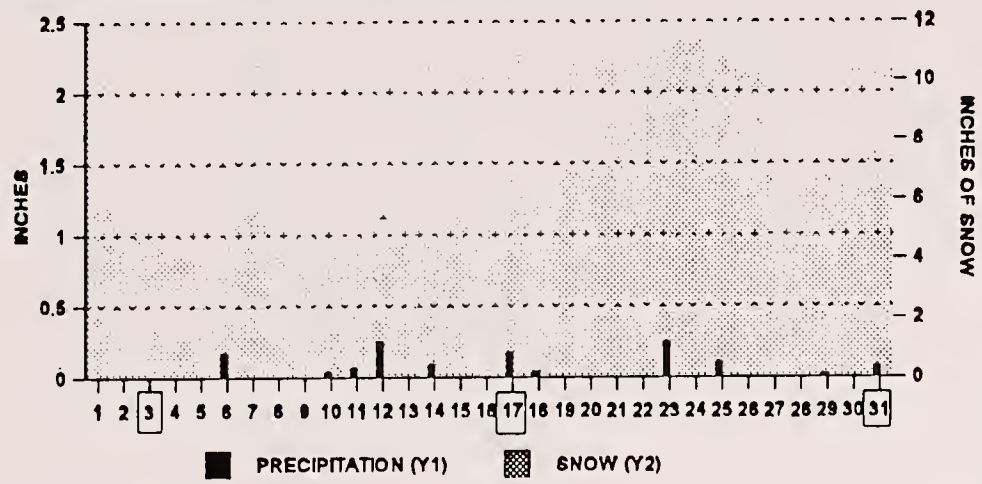
June 1998 - Precipitation Events
Coldbrook/Intake Works Sampler - Barre



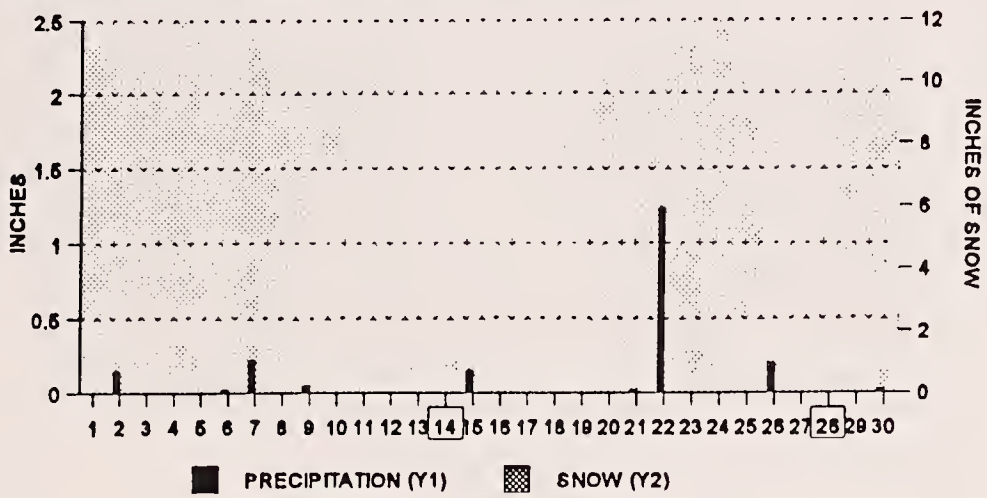
July 1998 - Precipitation Events
Coldbrook/Intake Works Sampler - Barre



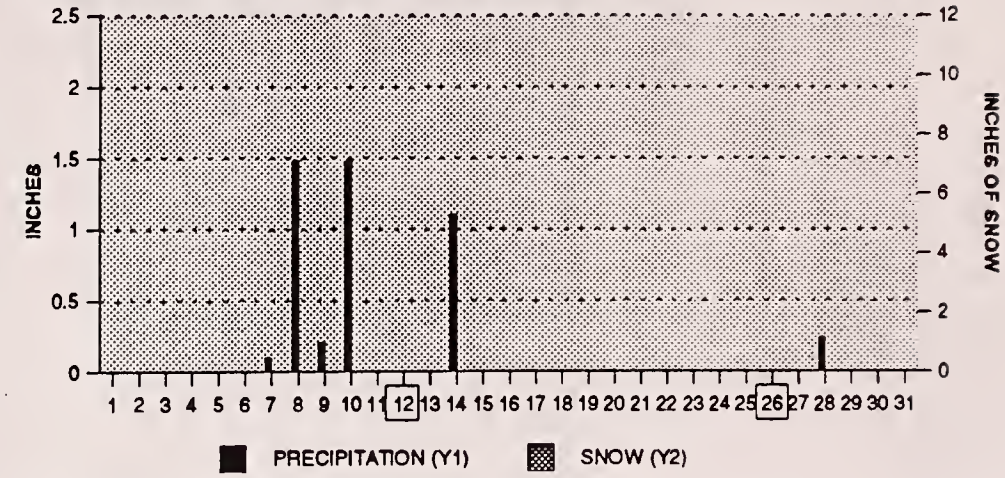
August 1998 - Precipitation Events
Coldbrook/Intake Works Sampler - Barre



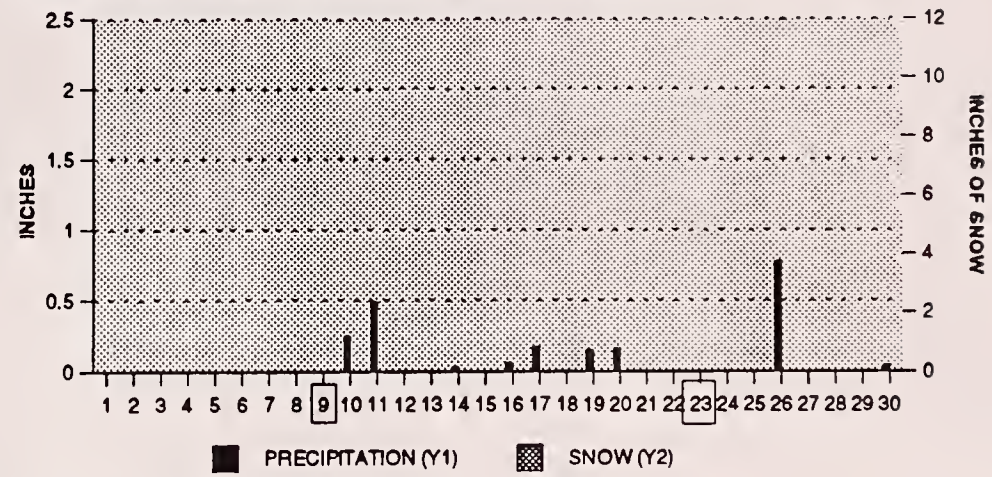
September 1998 - Precipitation Events
Coldbrook/Intake Works Sampler - Barre



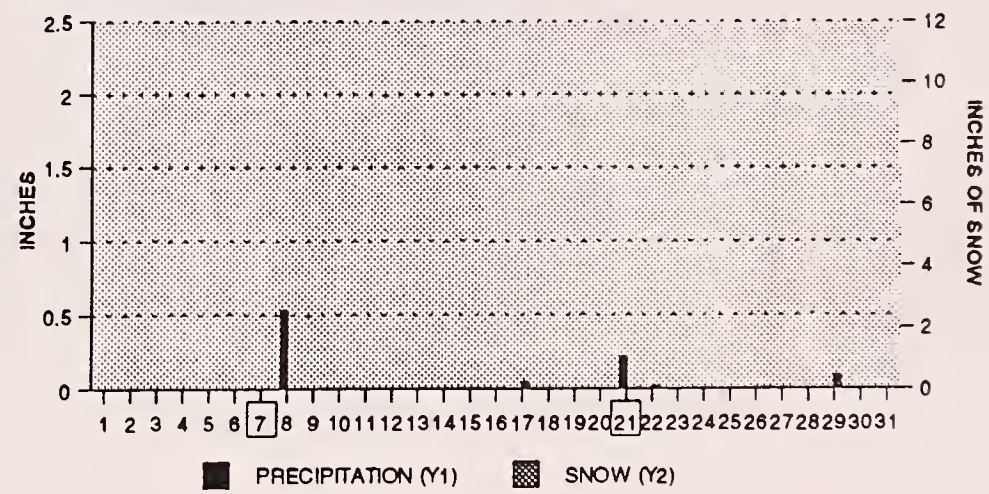
October 1998 - Precipitation Events
Coldbrook/Intake Works Sampler - Barre



November 1998 - Precipitation Events
Coldbrook/Intake Works Sampler - Barre



December 1998 - Precipitation Events
Coldbrook/Intake Works Sampler - Barre



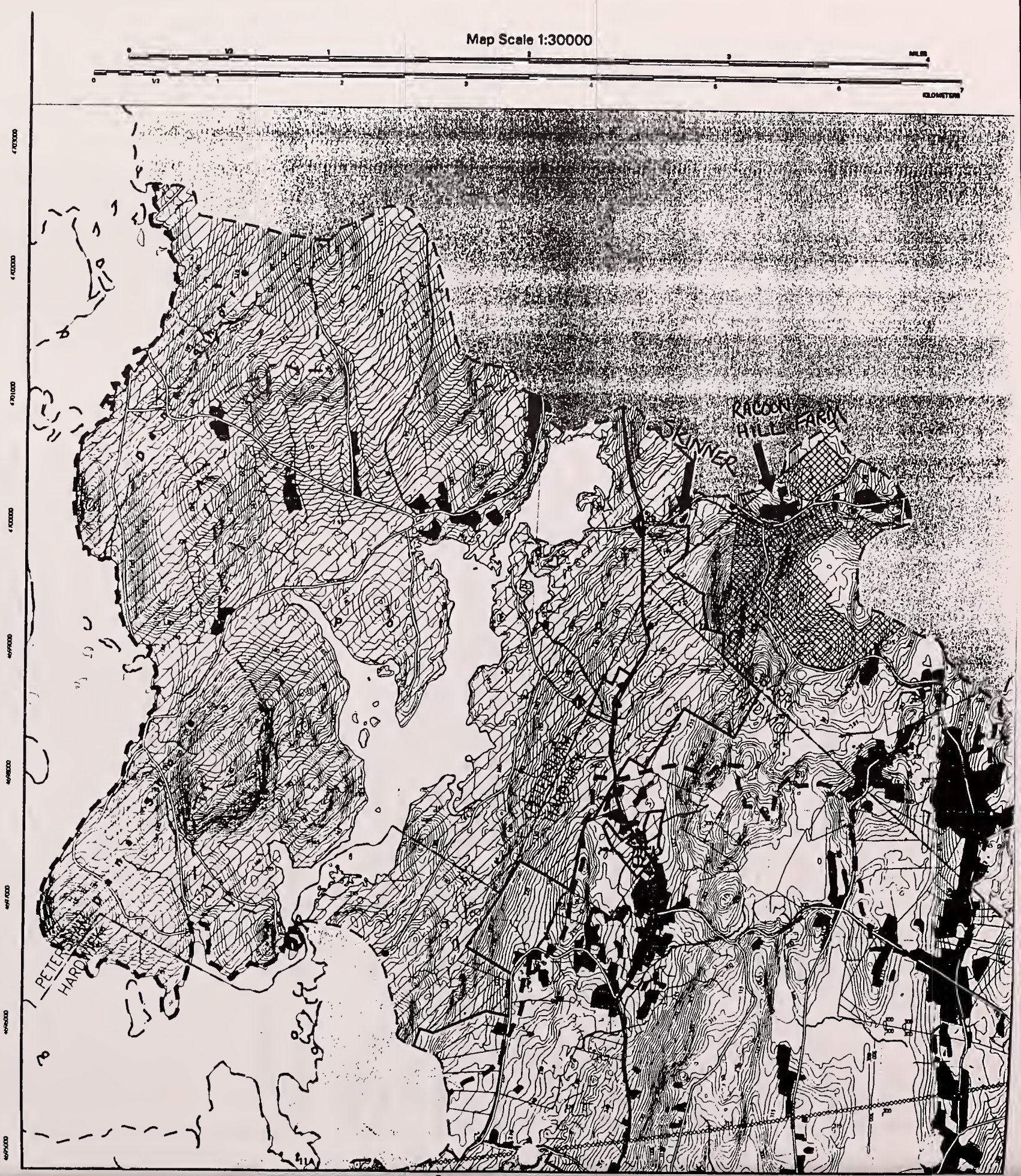
MEMO

To: Robert P. Bishop
From: Scott A. Campbell SAC
Subject: **Rand Brook - Stream Survey**
Date: May 12, 1998

Survey Area

Traveled.Barre Dana Road alongside northern branch of Rand Brook inside vehicle. A follow-up investigation was prompted following a fecal coliform count of 100 CFU/100 ml detected downstream on May 4th (sampling was conducted following heavy rains). Upstream of the brook's confluence at the gated entrance to DF&W lands, the brook stretches approximately 0.3 miles across private lands. Two surface water impoundments are located on this reach and include a 2-4 acre beaver impoundment at its headwaters, and, a small man-made pond dammed by a concrete dam at the base of the hill on which Racoon Hill Farm is perched. Beaver activity appears dormant - three lodges evident from roadside were overgrown with weeds. Activity on "farm" not visible from roadside, thus, a business card was left on mailbox requesting a follow-up phone call. At this time use of dammed pond is not known - possibly used strictly for recreation now and at some had been used for irrigation or watering purposes.

Attenpted to view marsh area behind Skinner property, beaver have histroically occupied this site, however, view from roadside obscured and not certain that area is free of beaver.


Map Scale 1:30000
MILES
KILOMETERS
RACOON HILL FARM
SKINNER
PETERSON
HARDWICKE
7

MEMO

To: Robert Bishop
From: Scott Campbell
Subject: **Cadwell Creek - Stream Survey**
Date: September 14, 1998

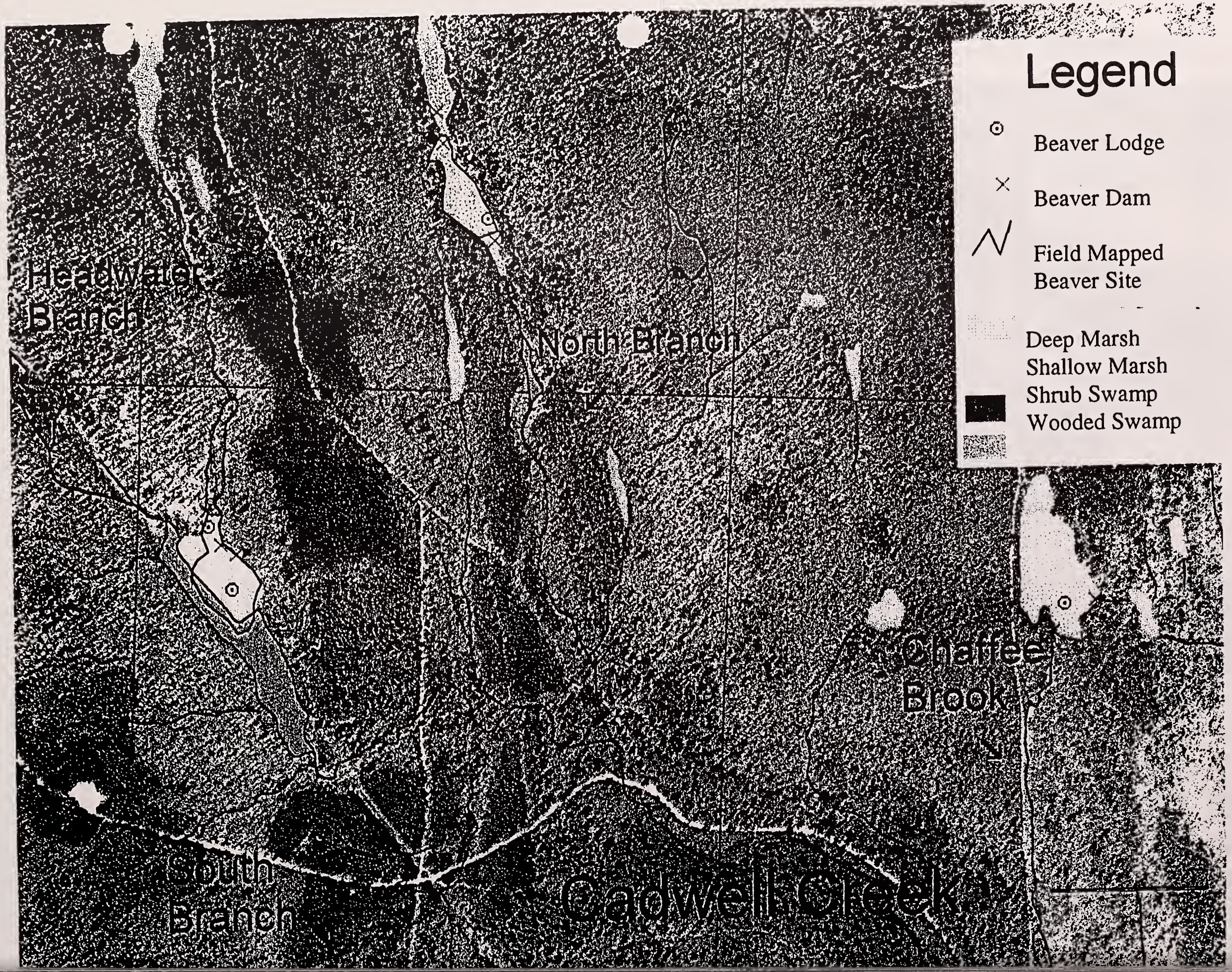
ABSTRACT: Beaver activity on the northern branch of Cadwell Creek is likely to have caused the abnormally high fecal coliform levels detected 1.7 miles downstream at the routine sample site on August 24, 1998. A stream survey of the northern branch revealed that a beaver dam five feet in height was undermined and partially breached as evident in slumping on the downstream face of the dam. The undermining of the dam resulted in the loss of beaver habitat and more importantly a downstream release of an estimated 300,000 gallons of water potentially contaminated by fecal matter. It is believed that the partial breach coincided with higher stream flows generated by the 0.57", moderately intense rainfall that ended just prior to sample collection on the day of the event. In what is believed to be a related matter, two weeks following this "event" a single beaver was sighted at the mouth of Cadwell Creek re-inhabiting a once abandoned lodge. As an added note, three beaver were removed by lethal means from the Chaffee Brook drainage two weeks following this incident.

Background

On August 28 and September 1, 1998, stream surveys were conducted in the Cadwell Creek drainage basin to determine the cause of an abnormally high fecal coliform "event" that occurred during routine water sampling conducted on August 24. The fecal concentration of 1200 colonies/100ml is abnormal in a stream in which fecal coliform typically averages in the range of 6-19 colonies/100ml. Field investigations suggest that a partial breach in a beaver dam 5 feet in height, located east of Dodge Hill on the northern branch of Cadwell Creek contributed a substantial "plug" of fecal contaminated water downstream. It is speculated that moderately heavy rainfall that occurred in the early morning hours on August 24 either moved this plug further downstream to the downstream sample site or that the dam failure coincided with heavy rains on the day of sampling. In either scenario, the downstream plug has been estimated at 300,000 gallons of water based on the recent two foot drop in water level observed across the 2 acre pond. The condition of the Dodge Hill site as noted on August 28 suggests a recent abandonment of beaver as evident in fresh chewing marks on the stumps of small saplings and the neatly groomed and stable condition of the lodge and dam (with the exception of the partial breach). The pond water levels at present are such that a suitable habitat is not provided for beaver and the site is absent of beaver. The rainfall that totaled 0.57 inches was preceded by four days of dry conditions and occurred during a month of below average rainfall.

Survey Area

The MDC collects water samples for routine water analyses on a bimonthly basis from a site (211B-X) established 30 feet upstream from the mouth of Cadwell Creek. Cadwell Creek is a 2.59 square mile stream basin located in the towns of Pelham and Belchertown that is almost exclusively owned (>99.5%) by the MDC. Cadwell Creek's main stream channel stretches approximately 2.1 miles across the basin, draining in a southeasterly direction before emptying into the sheltered cove at boat launch area I. A first order tributary named Chaffee Brook also discharges into Cadwell Creek roughly ten feet upstream of the routine sample site. Approximately 1.2 miles upstream from the routine sample site (see Map), the main channel of Cadwell splits into three branches: one (north branch) emanating from the north off the eastern face of Dodge Hill; one (south branch) emanating from the south off the eastern face of East Hill; and a third (headwaters) that drains in a southeasterly direction from the upper


Legend
Beaver Lodge
Beaver Dam
Field Mapped Beaver Site
Deep Marsh
Shallow Marsh
Shrub Swamp
Wooded Swamp
Headwater Branch
North Branch
Chaffee Brook
South Branch
Cadwell Creek

northwest headwaters of the basin.

The stream is gaged by a weir above a 90° V-notch located at the MDC sample site. During sampling on August 24 the gage height was 4.52 feet, representing an estimated flow of 1.8 cfs. In contrast, during follow-up investigations on August 28 and under dry conditions preceded by two days of dry weather, the gage was read at 4.08 feet (or 0.3 cfs). The difference in gage readings represents a six-fold increase in flow under storm conditions*. Average stream flows as measured by the USGS in 1989-90 averaged 3.3 cfs during the month of August**. The total precipitation of 1.49 inches for the month of August reflects streamflow conditions as this number is well below the 68 year average of 4.33 inches†.

Field Observations

North Branch (East of Dodge Hill)
A suspected beaver pond east of the summit of Dodge Hill became the focus of the investigation. The site is comprised of two interconnected but distinct impoundments, covering a total area of roughly 3.5 acres. The upper (northern) impoundment is representative of a site in which beaver occupied but have long since abandoned. Supporting evidence includes the large percentage of marsh grasses covering the site, the poor condition of the principal dam, and the scattered remnants of a lodge. In contrast , the lower impoundment is more representative of an altered site recently abandoned by beaver. The site covers 2 acres of barren ground and encircles nearly 100 standing deadwood trees. Tree damage surrounding the pond is largely unnoticed except for chew markings (some fresh) on the stumps of small saplings, 4-6" in diameter. A beaver lodge located on the banks of the pond at the southern end lies above the water line, fully exposed and in-tact. Open water is limited to a small area extending out from the large dam constructed at the southern end of the site (roughly 20-30% of site). Despite the lack of recent rainfall, the vast majority of the site had bare, but damp, mud flats suggesting that water levels within the pond had recently dropped. Water markings along the perimeter of the pond suggests the drop in levels to be two feet. It is believed that the water level drop occurred rapidly and that it is the result of the partial dam breach caused by slumping on the downstream slope of the main dam.

Headwaters Branch
Records dating back as early as the 1970's have mapped beaver sites below the power lines northwest of the intersection of Gate 8 Road and Dodge Road. More recently, beaver activity ½ mile upstream of the headwaters gaging weir was observed in December 1997. On September 1, both sites were inspected and classified as abandoned sites. The headwaters site contained a weed infested lodge and an in-tact, 3 ½ foot tall dam. Moreover, dried stream beds were noted both upstream and downstream of the impoundment. The site below the power lines contained a series of dams in disrepair and two, weed infested lodges abandoned by beaver. Both sites are included on the attached map, but, the absence of beaver activity on this reach discount it as a likely source of elevated fecal coliform levels.

File Review

Prior to field investigations MDC files were reviewed for pertinent information. MDC records revealed that active beaver on Chaffee Brook were not likely to have contributed to the fecal event since a field report completed on August 25 noted the condition of the principal dam impoundment to be stable and well established with a lack of downstream flow. Information on the absence of beaver on the south branch reported in July also discounted this branch as a significant threat. Water quality studies conducted within the basin were reviewed and in one study conducted throughout the summer of 1993††, abnormally high spikes of bacteria in tributaries of Cadwell Creek were detected. The study specifically identified two branches, the northern Dodge Hill branch and the northwestern headwaters branch, as potential problem sites and suspected beaver as the fecal source.

Table 1. Profile of Cadwell Creek.		
Characteristic		**Information Source**
Drainage Area	2.59 sq. miles	Mass GIS
MDC Land Ownership (%)	>99.5%	Mass GIS
Average flow	6.8 cfs	1989-90 USGS
August Average daily flow	3.3 cfs	1989-90 USGS
Measured flow 8/24/98	1.8 cfs	Field gage reading
Measured flow 8/28/98	0.3 cfs	Field gage reading
Precipitation - August 1998	1.49 inches	Admin. Bldg. Sampler-MDC
Precipitation - August (68 year average)	4.33 inches	Admin. Bldg. Sampler-MDC
Average fecal coliform concentrations 1995-97	6-19 colonies/100ml	MDC Water Quality Report 1995-97

Conclusions

Previous water quality investigations were reviewed and field investigations conducted to determine the nature of an unusually high fecal coliform level detected at the mouth of Cadwell Creek. Findings suggest that moderately heavy rains and a partial breach of a beaver dam are likely to have passed a plug of fecal matter downstream during grab sampling conducted at the tail end of the storm. A summary of the major conclusions are presented below.

1) Storm or "wet" weather flows in Cadwell Creek can be on the magnitude of six times greater than dry flow conditions.

2) Breaches of or even partially breached beaver dams can release a significant quantity of water downstream with measurable water quality impacts at some distance away.

*Gage readings provide only a relative measure of streamflow since the gage has not been calibrated and in active use since September of 1997.
**Reference: 1989-90 MDC/DEP Water Quality Report
† Reference: MDC/Administration Building Sampler
†† Unpublished paper: Summer 1993 Water Quality Report: Cadwell Creek Tributary System, Wages, H.E. (Cad898.wpd)

Photo 1 - Beaver dam east of Dodge Hill (lower impoundment). (Photo taken 8/28/98)

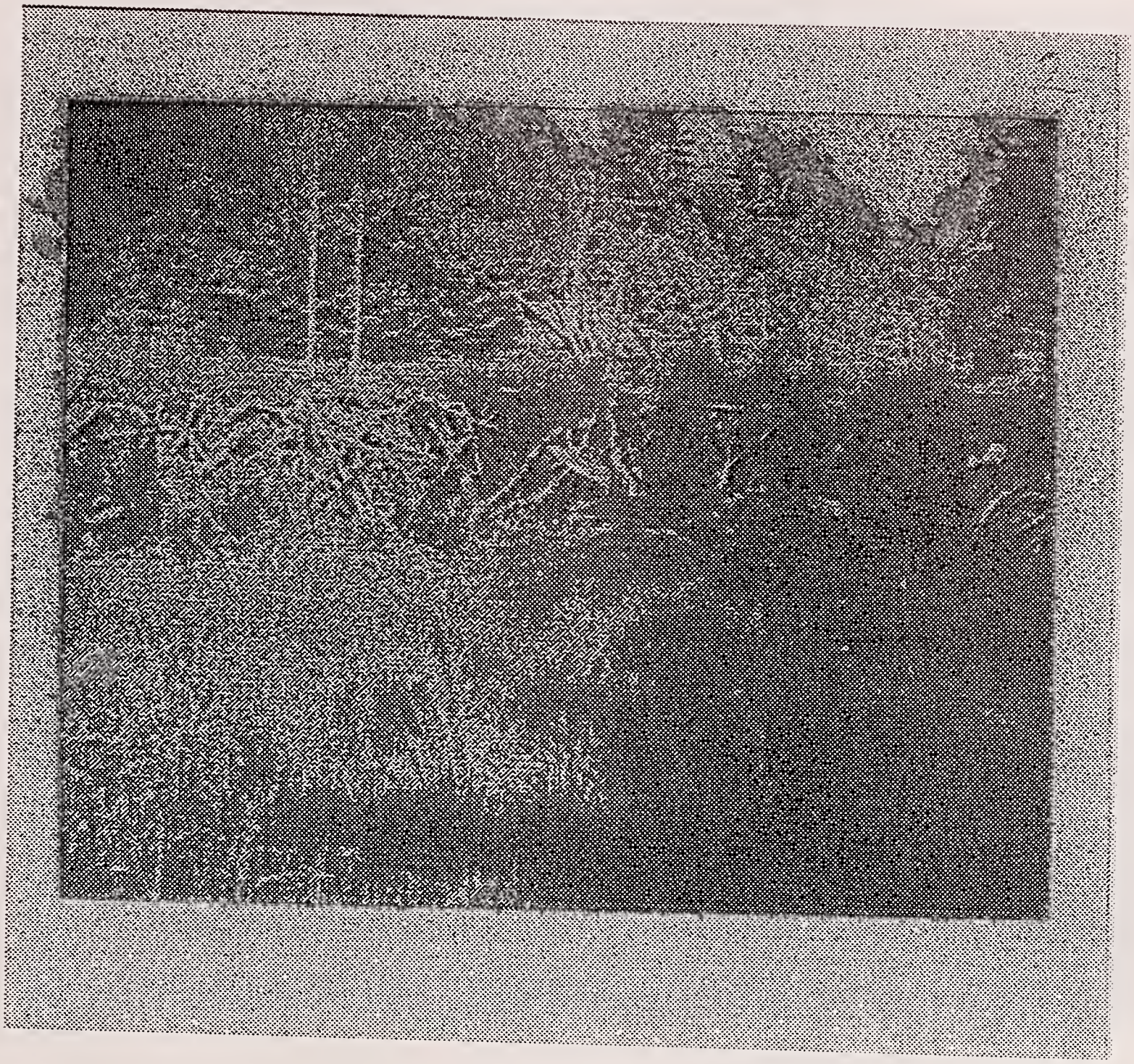


Photo 2 - Partial breach in beaver dam caused by slumping. (Photo taken 8/28/98)

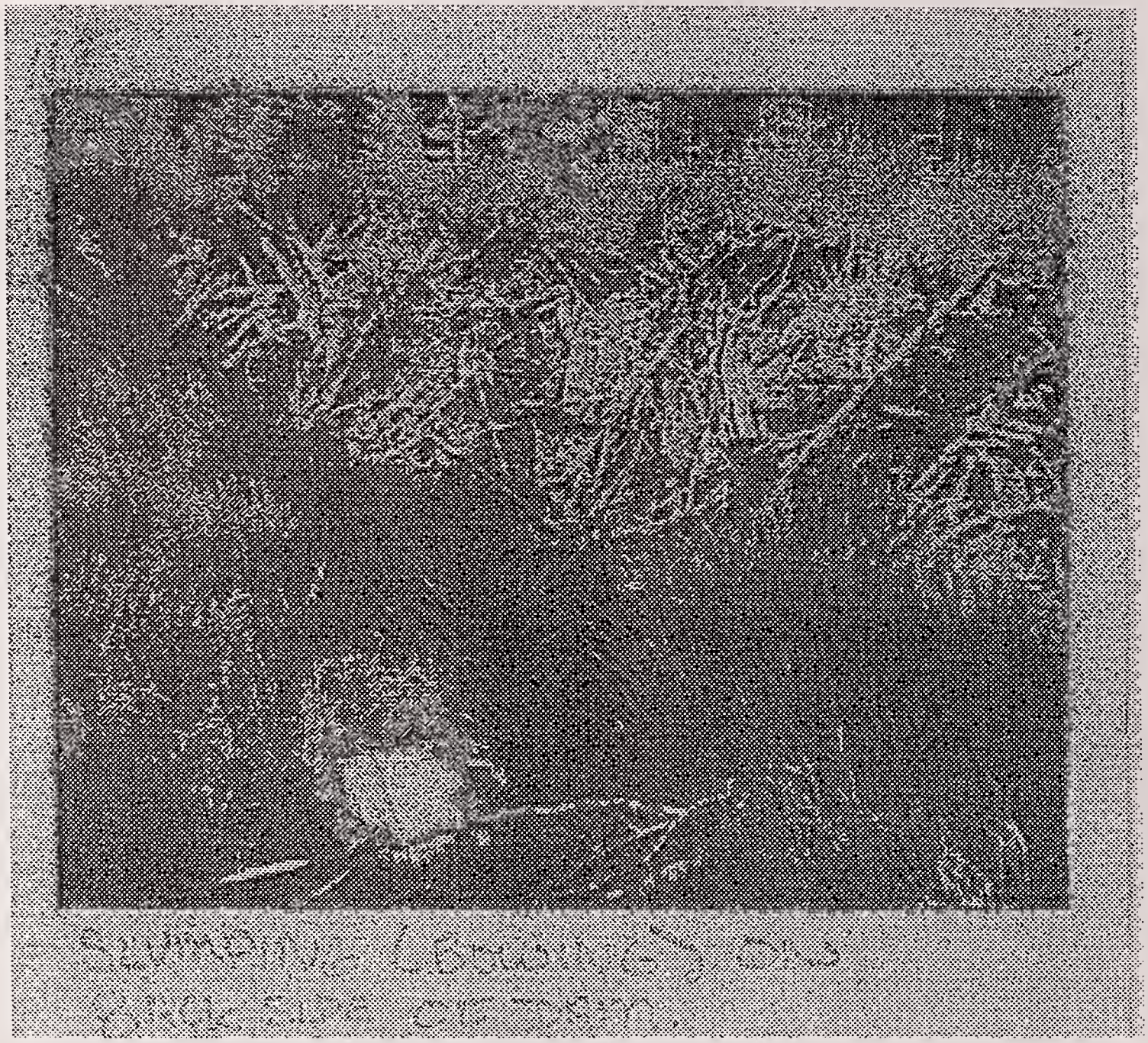
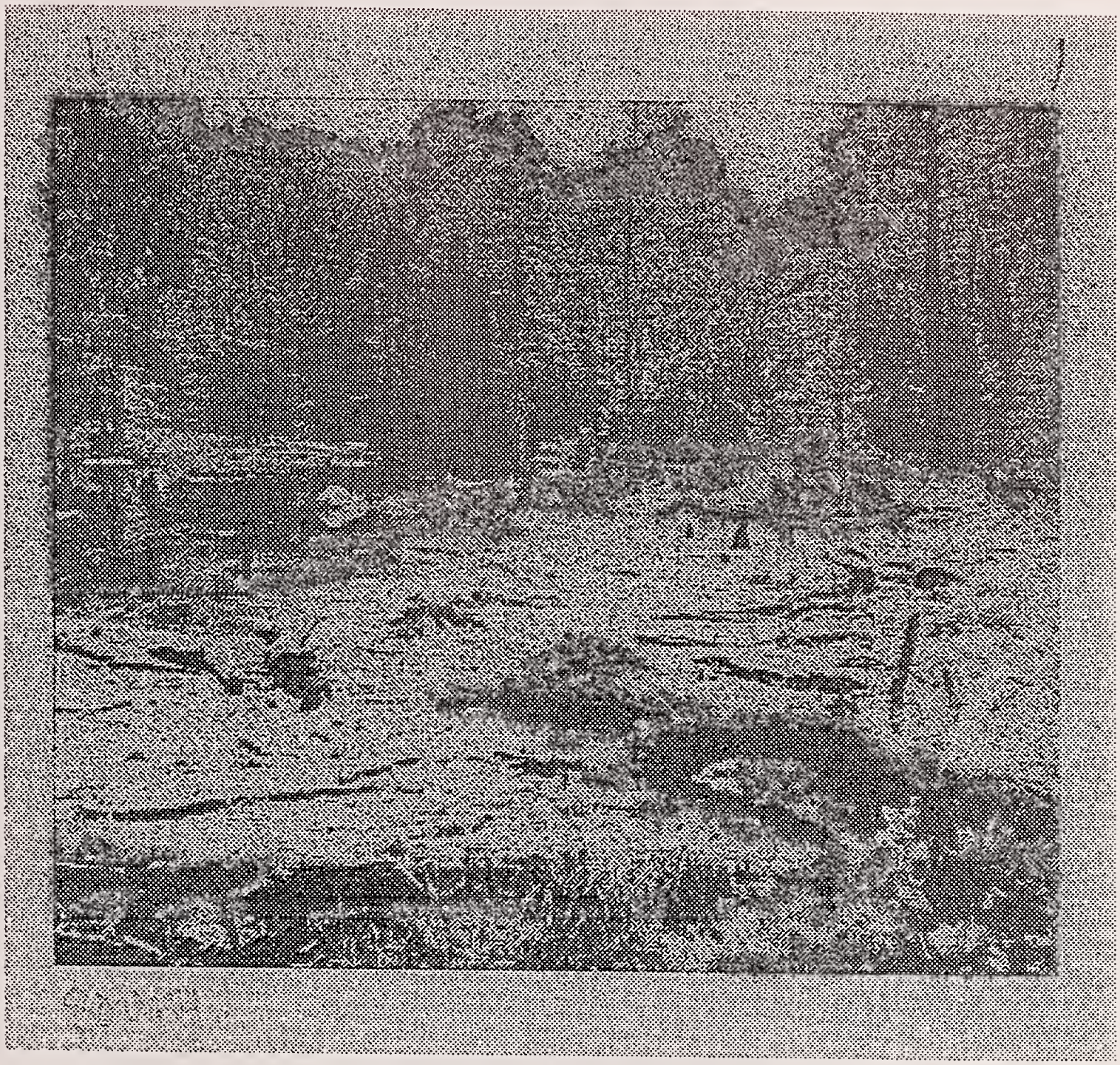


Photo 3 - Beaver impoundment east of Dodge Hill showing barren, damp pond bottom exposed by drop in water level. (Photo taken 8/28/98)



IMPERVIOUS COVER ESTIMATION
SAMPLE CALCULATION: BARRE FALLS (105)

METHODOLOGY

1) *Spring 1992-93 photo interpreted images were used to estimate coverage of land uses (Source: MDC/MWRA Landuse Program).*
2) *Roadways shown on USGS quad maps were measured directly to estimate impervious cover associated with roads (Source: Map measure).*
3) *Used standardized values of imperviousness associated with land uses reported by Kluitenberg, 1994 (Source: Rapid Watershed Planning Handbook, 1998).*

CALCULATION

Subwatershed						**Area (acres)**			
BARRE FALLS	**D.A.**	**Wet**	**Res**	**HD Res**	**Ind**	**Trnsp**	**Comm**	**Urb Op**	**For/Ag**
BRE_FLL	4851.2	868.0	39.6			21.0		32.1	3909.5
RUT_PRK	2009.6	351.7	45.6		11.3	25.6	10.0	14.8	1581.9
DEM_PD	1440.0	262.1	135.1	5.6		20.9	1.3	30.3	1009.9
MLL	2231.0	346.0	174.7	1.4	0.9	29.9	5.6	54.2	1648.5
POM	2393.6	409.5	126.9		17.4	24.0	1.4	5.2	1827.5
EB	7084.8	1041.5	340.9		53.1	146.1		47.7	5602.5
COMET	537.6	160.0	23.8			6.6		0.8	351.2
EB_HDW	4089.6	767.0	85.8			42.9		6.0	3221.1
WB	3366.0	484.8	79.5		15.7	41.1	9.5	18.2	2708.3
WB_HDW	7268.0	1119.2	278.7		32.7	70.4	7.6	2.8	5827.2
Totals:	35271	5810	1331	7	131.1	428.5	35.4	212.1	27688
Impervious Ratio		NI	0.19	0.38	0.76	0.85	0.56	0.11	0.02
Impervious Area		NI	252.8	2.66	99.64	364.2	19.82	23.33	553.75
Total Impervious Area = 1316					D.A. less Wet Area = 29462				
Impervious Cover (%) =			**(1316 / 29462) * 100 =4.5%**						

Sheet 2 - Impervious Cover cont.

Land Use Codes:

WET - Wetland	RES - Residential	HD RES - High Density Residential
IND - Industrial	TRNSP - Transportation	COMM - Commercial
URB OP - Urban Open	FOR/AG - Forestry/Agricultural	

Sanitary Subdistrict Codes:

BRE_FLL - Barre Falls	RUT_PRK - Rutland State Park	DEM_PD - Demond Pond
MLL - Mill Brook	POM - Pommogussett	EB - East Branch (Ware)
COMET - Asnacomet Pond	EB_HDW - East Branch Headwaters	
WB - West Branch (Ware)	WB_HDW - West Branch Headwaters	

OTHER CODES:

D.A. - Drainage Area (acres)

NI - Not Included in calculation of impervious cover. (Note: Wetland area subtracted from total drainage area to figure impervious nature of land area.)

ASSUMPTIONS

1) *Roadways categorized and assigned standard widths as follows: State Roadways - Width = 26 feet*
Local Roadways - Width = 22 feet
MDC Roads - Width = 20 feet

2) Imperviousness fraction of 0.85 used to characterize all roadways (Source: SCS TR-55).

2375 02

Table 6.2 Impervious Cover (%) for Various Land Uses

Land Use	Density (dwelling units/acre)	Source				
		Northern Virginia (NVPDC, 1980)	Olympia (COPWD, 1995)	Puget Sound (Aqua Terra, 1994)	NRCS (USDA, 1986)	Rouge River (Kluitenberg, 1994)
Forest	--	1	-	-	-	2
Agriculture	--	1	-	-	-	2
Urban Open Land	--	-	-	-	-	11
Water/ Wetlands	--	-	-	-	-	100
Low Density Residential	<0.5	6	-	10	-	19
	0.5	-	-	10	12	
	1	12	-	10	20	
Medium Density Residential	2	18	-	-	25	
	3	20	40	40	30	
	4	25	40	40	38	
High Density Residential	5-7	35	40	40	-	38
Multifamily	Townhouse (>7)	35-50	48	60	65	-
	High Rise (>20)	60-75	48	60	-	51
Industrial	--	60-80	86	90	72	76
Commercial	--	90-95	86	90	85	56

1: NVPDC Data Measure Effective Impervious Area (i.e., rooftops are not included in residential data)

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